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**UNIVERSITY OF GHANA**

**COLLEGE OF HUMANITIES**

**UNIVERSITY OF GHANA BUSINESS SCHOOL**

**THE DRIVERS, PROCESSES, AND OUTCOMES OF THE  
DIGITAL TRANSFORMATION OF SMES IN DEVELOPING COUNTRIES**



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**UNIVERSITY OF GHANA**  
**COLLEGE OF HUMANITIES**

**THE DRIVERS, PROCESSES AND OUTCOMES OF THE  
DIGITAL TRANSFORMATION OF SMES IN DEVELOPING COUNTRIES**

**BY**

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## DECLARATION

I declare that this thesis results from my work produced through research I conducted under supervision. This thesis has not been presented by anyone for any academic award at this or other institutions. All references to work done by others have been duly acknowledged and cited. This thesis has been prepared per the requirements of the School of Graduate Studies, University of Ghana. I am solely responsible for any shortcomings in this work.



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## ABSTRACT

Digital technologies are reshaping the models, processes, culture, and customer experiences of organisations. This reshaping of organisations with fundamental changes resulting from the adoption of digital technologies and digitalisation is known as digital transformation (DT). Digital transformation tends to matter to all organisations, and small and medium enterprises (SMEs) are not left out. However, the review of extant literature concerning DT reveals SMEs' vulnerability, particularly those in developing countries (DCs). It shows that there is room for SMEs to gain more from DT, with three significant gaps that need research attention.

*First*, there is a lack of agreement in the literature regarding what constitutes the DT drivers, processes and outcomes. *Second*, studies on DT, examine drivers, processes, and outcomes as independent constructs, and there is a paucity of research examining their interrelationships. *Third*, the current studies on DT in SMEs are silent on how the firms' managerial and organisational capabilities and capacities influence the drivers processes and outcomes. *Lastly*, in this regard, a theoretically grounded and practice-oriented framework for the DT of SMEs is lacking. Hence, most SMEs in DCs tend to trail the DT path arbitrarily.

In response, this doctoral thesis seeks to address the above gaps and develop the framework by *exploring the drivers, processes and outcomes of DT and the relationships among them while considering the influence of the capabilities and capacities of SMEs in DCs*. To achieve this purpose, the following questions are asked: (i) *What are the drivers, processes, and outcomes of the DT of SMEs in DCs?* (ii) *How do the drivers, processes, and outcomes influence one another, in the DT of SMEs in DCs?* (iii) *How do the SMEs capabilities and capacities influence the drivers, processes, and outcomes of the DT in DCs?*

Such a study would be a strategic assessment of how to approach DT and achieve the desired outcomes. This assessment is critical in the current era, where digital innovation proliferation and social, economic and health challenges (including the COVID-19 pandemic) are compelling organisations to embrace DT. Hence, developing a framework to guide DT research and SMEs' practice of DT in DCs is a timely endeavour.

To respond to the research questions, the study utilised the Adaptive Structuration Theory (AST) to conceptualise the DT drivers, processes, and outcomes. AST is appropriate because it highlights *drivers* of DT from both technological and organisational perspectives while focusing on the technology and organisation interaction *processes* as structuration and appropriation, resulting in the *outcomes*. The study further considered other literature to conceptualise the *capabilities* and *capacities* of SMEs.

To facilitate the exploration, the study's research strategy utilised a *qualitative Delphi* methodology from a *critical realism* perspective, with responses from sixteen purposively selected DT experts from six DCs. DT is a contemporary phenomenon with structures that need to be unearthed and explored to clarify its understanding and applications. Coupled with the lack of agreement on DT factors and the incomplete knowledge of the DT phenomenon, the research strategy was justified.

In responding to the first research question, the study unearthed typologies of the DT drivers, processes, and outcomes to offer new insight into studying DT. The study revealed six dimensions of the drivers of DT. Among them, the *technological*, *organisational*, and *environmental*-related drivers have been previously established in literature. However, the dimensions of *work tasks*, *emergent outputs* and *new rules and resources* were found as newly

identified drivers of DT in this study, which hitherto were absent in literature. Again, the findings offer a novel classification of the technological-related drivers as *dynamic* (changing), *steady* (fixed), and *spirit* (goals and values) features. The steady features are the inherent and fixed structural attributes, such as comprehensiveness and accessibility. The dynamic features are the changing and improving attributes, like updatability, customisability and changing trends. The spirit features are the overall intentions regarding goals and values fundamental to the structural features, such as efficiency, effectiveness, and accuracy.

The findings outline five DT processes: *decision-making and adoption, implementation and use, changes in function and resources, adjustment and adaptation, and strategic shifts and positioning*. Though application in practice may vary, most DT studies do not clearly define stepwise and sequential processes. The stepwise and sequential nature of the processes from this study is being advocated as an adaptable guide. Moreover, the findings reveal six DT outcomes: *business image and value, work processes and functions, resources and abilities improvements, customer and stakeholder satisfaction, productivity and profitability, and undesirable consequences of technology use*. However, embracing *undesirable consequences* as one of the possible outcomes is scarcely mentioned in DT literature.

For the second research question, the study reveals the relationships and influences among the factors. These effects are the influence of drivers on processes, the influence of drivers on outcomes, the influence of processes on outcomes, and the influence of outcomes on drivers. These influences were hitherto not established in literature. For example, *technological features* drivers influence the *decision-making and adoption, implementation and use, and adjustment and adaptation* processes. In contrast, *work-task* drivers influence the *changes in functions and resources* alone.

Regarding the third research question, the study determined four major dimensions of SMEs capabilities and capacities, which influences the DT drivers, processes, and outcomes. The study also identifies novel classifications of capabilities and capacities as *intrinsic* and *extrinsic*, and managerial capabilities as *attributes* and *relationships*. These findings offer the opportunity to know which capabilities and capacities to leverage and infuse and how they influence the drivers and processes to achieve the desired outcomes. For example, while the *managerial capacities* influence the *decision-making and adoption, implementation and use, and adjustment and adaptation*, the *organisational capacity* instead influences the *changes in function and resources, adjustment and adaptation, and strategic shifts and positioning*.

The findings culminate into a theoretical and practice-based framework (DPOCC Framework), with simplified steps and two-pronged approaches: Driver-led approach is to identify the compelling drivers and optimise the matching processes to achieve corresponding outcomes while considering the capabilities and capacities influence. The outcome-led approach is to specify the desired outcomes and optimise matching processes with corresponding drivers while considering the effects of capabilities and outcomes. This framework offers SME owners, entrepreneurs, and managers the opportunity to critically examine and improve their DT practices. Its successful post-study evaluation affirmed this thesis' contribution to practice.

Policy-wise, the findings guide stakeholders such as government and industry to appreciate the DT of SMEs regarding the drivers, processes, outcomes, capabilities, and capacities. The study also inures itself as a guiding solution to the need for DT arising from the new normal of business stemming from the COVID-19 pandemic. Hence, this study is critical in providing strategic digital growth and sustenance directions. The study's contributions have been published as *two journal articles, three book chapters and two conference papers*.

## DEDICATION

TO THE GLORY OF GOD

*This thesis is dedicated to my beloved wife, Juliana Gloria Anim-Yeboah,  
and my lovely children, Dorothy, Lemuel, and Hanniel.*

Undertaking a PhD programme and writing the thesis is like running a marathon.

The first thought is that the journey is tedious and almost impossible.

But gradually, the vision gets clearer, and the motivation becomes stronger to continue.

Then the realisation unfolds, "Yes, I can do it." And now, "I have done it."

This realisation brings into perspective the quote by Nelson Mandela:

*".. it always seems impossible until it is done."*

Meanwhile, Jesus Christ also assures in Matt. 19:26 (NIV) that:

*".. with men, this is impossible, but with God, all things are possible."*

Now that the thesis has been completed, King Solomon cautions in Eccl. 12:12-13 (NIV):

*"Be warned, my son, of anything in addition to them.*

*Of making many books, there is no end, and much study wears the body.*

*Now that all has been heard, here is the conclusion of the matter:*

*Fear God and keep his commandments, for this is the duty of all humankind."*

I then cherish and obey this instruction because of the advice in Prov. 9:10 (NIV):

*"The fear of the LORD is the beginning of wisdom,*

*And knowledge of the Holy One is understanding."*

## ACKNOWLEDGMENT

*Amidst the efforts, arduous work, frustrations and uncertainties, passion and ambition, God's grace and favour provide the impetus to continue this long, sometimes lonely journey.*

So, my uttermost appreciation goes to the **Lord God** for granting me the grace, favour and strength to go through the PhD course and complete the thesis.

Nevertheless, it has taken the guidance of supervisors, encouragement of peers, and the support of loved ones, to accomplish this mission that seemed impossible until it was completed.

Hence, my expression of gratitude to all who helped make this thesis a success and without whom it would not have been possible to achieve this feat.

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## LIST OF ABBREVIATIONS

AIT	-	Advanced Information Technology
AST	-	Adaptive Structuration Theory
COVID-19	-	Corona Virus Disease - 2019
CRM	-	Customer Relation Management
DCs	-	Developing Countries
DE	-	Developing Economy
DMC	-	Dynamic Managerial Capabilities
DPOCC	-	Drivers, Processes, Outcomes, Capabilities and Capacities,
DSR	-	Design Science Research
DT	-	Digital Transformation
EC	-	European Commission
ERP	-	Enterprise Resource Planning
EU	-	European Union
ICT	-	Information and Communication Technologies
IT	-	Information Technology
IoT	-	Internet of Things
MRP	-	Manufacturing Resource Planning
MSME	-	Micro, Small and Medium Enterprise
OECD	-	Organisation for Economic Corporation and Development
RBV	-	Resource-Based View
SME	-	Small and Medium Enterprise

## CHAPTER ONE

### 1 INTRODUCTION

#### 1.1 Research Background

The emergence and use of innovative and digital technologies have shaped and transformed society and organisations globally (Bughin et al., 2017). The proliferation and adoption of digital technology platforms and tools have transformed and permeated all facets of organisations and societies (Garcia, 2018). The distinctions that organisations and societies have achieved may be ascribed to the advancement, acceptance, and use of digital technologies and innovations (Yunis et al., 2018).

The integration of digital technologies as part of humankind's daily work and life is described as *digitalisation* (Bughin et al., 2017; Yunis et al., 2018). Digitalisation has been described in many ways by different authors. According to Ochs and Riemann (2018), digitalisation integrates digital technologies into organisations and societies by digitising things in daily life. Furthermore, digitalisation involves adopting or using digital technologies to modify business structures, systems, and strategies (Bican & Brem, 2020; Gobble, 2018).

Digitalisation that has transformed and continues to transform businesses and organisations is described as *Digital Transformation* (DT). The term DT is also used in organisations to refer to modest digital technology initiatives such as putting services online and the extensive digitalisation of the entire enterprise (Gong & Ribiere, 2021). Generally, firms' operational and organisational changes resulting from adopting and digitalising digital technologies have also been designated DT (Ziyadin et al., 2019). According to Gong and Ribiere (2021, p. 12), DT

is a “Fundamental change process, enabled by the innovative use of digital technologies, accompanied by the strategic leverage of key resources and competencies, aiming to radically improve an entity and redefine its value proposition for its stakeholders.” (An entity could be an organisation, an institution, a business network, a firm, an industry, or a society).

Even though DT is a lately conceptualised term (Mergel et al., 2019), the knowledge of digital technology adoption and adaptation has existed for a much more extended period with past studies and literature (Bockshecker et al., 2018). Meanwhile, adopting digital technologies results from a drive and motivation to use and benefit from the technologies. At the same time, specific processes must be followed in the expected transformation to attain the anticipated positive outcomes (Liere-Netheler et al., 2018). Therefore, the drivers, processes and outcomes of DT are essential factors in any digitalisation effort, as the correct drivers and the appropriate processes may determine the proper outcomes. The drivers are attributes that influence and enable the occurrence of DT. In contrast, processes are the specific activities needed for DT, while outcomes are the emerging benefits and outputs realised in DT (Morakanyane et al., 2017).

The advent and permeation of DT could be considered essential for the survival of most small and medium enterprises (SMEs). SMEs are firms that employ a maximum of 249 persons, with further categorisation as micro (1 to 9), small (10 to 49), and medium (50-249) employee sizes (OECD, 2017). DT promotes the automation of tasks and satisfies SMEs' core organisational, management, and employee needs (Saarikko et al., 2020). It also facilitates communication, simplifies processes, and offers prospects for managing SMEs' business records and data analytics (Ismail et al., 2017). Without the commitment to adopt digital technologies and innovations, and the obligation to sustain DT, most businesses and, for that matter, SMEs may

not be as productive as anticipated (Berman & Bell, 2011; Li, 2020). Successful DT helps to empower organisations to achieve fast revenue growth, promote sustainable profitability gains, and boost market share, and SMES are no exception (Parida et al., 2019).

Meanwhile, there is enough proof that larger and more prominent firms usually have better capabilities and capacities to successfully leverage digital technologies (Parida et al., 2019). However, smaller, and less prominent firms lack the capabilities and capacities to leverage digital technologies, which could lead to failure in transforming digitally (Saarikko et al., 2020). These two factors of capabilities and capacities constitute the dimensions of managerial and organisational abilities that can influence the DT of SMEs (Anderson & Adams, 2019; Helfat & Winter, 2011). *Capabilities* refer to the features, abilities, faculties, or processes that can be achieved, developed or improved. In contrast, *capacities* refer to the features, abilities, or resources that can be possessed or exist (Parker, 2018).

SMEs vulnerability in capabilities and capacities is prominent in developing countries (DCs) (Al Maamari & Bhuiyan (2021). Hence, due to capabilities and capacities challenges, digitalisation could be a mirage for some SMEs in DCs (Priyono et al., 2020). The managerial and organisational capabilities and capacities help enterprises negotiate the digitalisation curve (Anderson & Adams, 2019; Helfat & Winter, 2011). Therefore, capabilities and capacities contribute to establishing DT efforts (Li, 2020). Meanwhile, SMEs' capabilities and capacities could further influence the factors of DT drivers, processes and outcomes, particularly in DCs. Consequently, it is crucial to examine DT drivers, processes, and outcomes, the relationships among them, and the influencing effect of the SMEs' capabilities and capacities.

## 1.2 Research Problem

Some studies have emphasised that advances in digital technologies over time influence corresponding changes in enterprises or organisations undergoing DT (Bockshecker et al., 2018; Li et al., 2018). Moreover, digital technologies shape entrepreneurial trajectories, and their intersection constitutes the fundamentals of the DT of enterprises (Nambisan, 2017). However, the working mechanisms of such trajectories in digital entrepreneurship remain unexplained (Nambisan, 2017).

Therefore, research on the involvement of digital technologies in shaping organisational transformation and entrepreneurial trajectories, and for that matter, research on DT and its conceptualisation, is called for (Nambisan, 2017). Meanwhile, a review of the extant literature on the DT of SMEs reveals some significant gaps that are worthy of consideration in DT research.

*First*, as a new field, there is a lack of agreement on what constitutes DT drivers, processes, and outcomes (Liere-Netheler et al., 2018). Meanwhile, some research pieces have unearthed different but related factors of DT of SMEs (Liere-Netheler et al., 2018). Moreover, new external factors like the COVID-19 pandemic are beginning to drive DT and generate significant outcomes. This trend and effect call for a review of DT drivers and outcomes (Indriastuti & Fuad, 2020; Kumar & Ayedee, 2021; Priyono et al., 2020). Meanwhile, the rapid changes in digital technologies and the dynamic nature of DT result in changing drivers over time, with possible changes in corresponding processes and outcomes (Châlons & Dufft, 2017).

Therefore, periodic reviews of the drivers of DT and other factors like DT processes and DT outcomes are recommended to reflect the changing trends and nature of technologies and

organisations (Hanelt et al., 2021; Solis & Littleton, 2017; Verhoef et al., 2021). Outcomes of DT have even been identified as major drivers of DT, and Mahmood et al. (2019), acknowledge the lack of studies and recommend further studies in that direction. Moreover, Berghaus and Back (2017) suggest that future studies consider the DT approaches and effects in different situational contexts. Hence, exploring the drivers, processes and outcomes of DT would help bring some understanding and improvement to the DT phenomenon.

*Second*, current studies on DT examine DT drivers, processes, and outcomes as independent constructs (Elia et al., 2020; Ivančić et al., 2019; Osmundsen et al., 2018), and there is a paucity of studies that examines the interrelationships among them (Hrustek et al., 2019; Liere-Netheler et al., 2018). Moreover, Reis et al. (2018) confirm that there is not much literature on the influence of the drivers on the processes and outcomes of DT. Meanwhile, recent research shows that a strong appreciation of the factors driving the need to use digital technologies and their influence on DT outcomes is necessary, yet lacking in the literature (Osmundsen et al., 2018; Parida et al., 2019).

Beyond adoption, it is essential to assess how the same drivers of adoption may influence the DT processes and the outcomes (Parida et al., 2019). Enterprise leadership might be interested in measuring the success of digital initiatives and the underlying causes of the success. However, without understanding what drives success factors further, it will be challenging to know how they influence success (Liere-Netheler et al., 2018). Therefore, it is crucial to investigate the nature of drivers and their influences on other factors of the DT to shape a mature research discussion and understand the associated disruptive change (Liere-Netheler et al., 2018).

Liere-Netheler et al. (2018) strongly call for further research and more insight into the effects of drivers on outcomes beyond mere identification. Then again, Hrustek et al. (2019) classify DT drivers as customer-driven, technology-driven, and organisational-driven. This classification only suggests that the DT drivers may influence DT outcomes and create business models differently, but Hrustek et al. (2019) do not show proof of such a relationship. Hrustek et al. (2019) further emphasised that determining the influences of the DT drivers and their types on other factors is more critical than merely identifying them. Therefore, understanding the concept of DT and clarifying the related factors and their influences is imperative in contemporary times (Muditomo & Wahyudi, 2021).

*Third*, the current studies on DT in SMEs are silent on how the capabilities and capacities of firms influence DT drivers, processes, and outcomes (Muditomo & Wahyudi, 2021; Taruté et al., 2018). Understanding the influence of capabilities and capacities on DT drivers, processes, and outcomes will likely serve as a strategic assessment of how to approach DT and achieve the expected outcomes (Zhang et al., 2022). Moreover, Nambisan et al. (2019) express the possibility for potential research to embrace a universal attitude of considering firms' capabilities and capacities as influencing digitalisation at various levels and from disparate disciplinary viewpoints.

Meanwhile, Li et al. (2018) emphasise the need for further research in tackling other aspects of DT, like organisational structure, capacities, capabilities, and procedures. Additional emphasis is also placed on SMEs' capability and capacity building and their influence on DT and entrepreneurship (Li et al., 2018; Vial, 2019). Furthermore, any organisational variations due to DT depend on the capabilities and capacities of the firms (Ambrosini & Altintas, 2019; Helfat & Martin, 2015; Helfat & Winter, 2011). Capabilities and capacities vary in different

situational contexts, and there is a need to consider the DT approaches and effects in different contexts (Berghaus and Back, 2017).

Moreover, SMEs in DCs have apparent capabilities and capacities limitations (Handoko et al., 2019). Due to these limitations, the potential of DT as a tool for SMEs' growth and competitive advantage looks blurred in SMEs of DCs, and the need for further research into their capabilities and capacities' influence is called for (Issa et al., 2018; Li et al., 2018; Rassool & Dissanayake, 2019). A scoping review of the DT of SMEs in sub-Saharan Africa reveals quite a not-too-good situation (Achieng & Malatji, 2022). Their findings show economy-based, market-based and socio-technical contextual factors emerging as themes that impede DT of SMEs in the SSA region. "In the SSA context, SMEs face numerous regional constraints that create barriers in their operations, such as limited access to profitable and value-added markets" (Achieng & Malatji, 2022). Therefore, it is imperative to ascertain how the SMEs capabilities and capacities influence the DT factors, particularly in DCs.

*Fourth*, there is currently no theoretically grounded and practice-oriented framework specific to the DT of SMEs (North et al., 2019). Hence, most SMEs in DCs tend to follow the DT path arbitrarily. The lack of clarity in understanding the relationships and influences among the drivers, processes, outcomes, capabilities and capacities leads to the need to appreciate DT conceptualisation (Morakanyane et al., 2017). Furthermore, conceptualisation involving multiple factors leading to framework development is scanty in the extant literature, and very few studies conceptualise DT of SMEs (Jöhnk et al., 2020; Van Veldhoven & Vanthienen, 2019; Verina & Titko, 2019). Moreover, DT is only partially covered by conventional frameworks on organisational change (Hanelt et al., 2021).

The review of frameworks proposed for DT-related research shows that the most frequently used frameworks are the ones scientifically validated for IS research in general and not specific to DT (Subramanian et al., 2021). These frameworks include the Technology Acceptance Model (TAM) (Venkatesh & Bala, 2008), the Unified Theory of Acceptance and Use of Technology framework (UTAUT) (Negahban & Chung, 2014), and the Technology, Organisation, Environment Framework (TOE) (Subramanian et al., 2021). These are reviewed in Section 3.3.1.

However, other frameworks exist that are specific to DT but are not scientifically validated (Nwaiwu, 2018). Most are practitioner-based frameworks and are unfamiliar with academic literature (Modiba et al., 2018; Subramanian et al., 2021). That notwithstanding, their reviews are helpful since DT resides in a practitioner domain and context. These frameworks have been reviewed in Section 3.3.2. The reviewed frameworks preclude *DT maturity models*, which assess the maturity levels and strategies of firms that have already digitally transformed, matured and moved into strategic dimensions (Bumann & Peter, 2019; Teichert, 2019).

Interestingly, none of the frameworks (conventional IS or DT-specific frameworks) contemplates the multiplicity of DT factors (Modiba et al., 2018; Nwaiwu, 2018; Subramanian et al., 2021). Moreover, there is no evidence in the extant literature of an existing DT framework concerning DT drivers, processes, outcomes, capabilities and capacities (Jöhnk et al., 2020; Osmundsen et al., 2018; Van Veldhoven & Vanthienen, 2019; Verina & Titko, 2019). Therefore, a significant gap exists in the conceptualisation of DT regarding drivers, processes, outcomes, capabilities and capacities and leading to framework development for DT of SMEs in DCs. Such conceptualisation and framework are what this study seeks to achieve.

*Fifth*, using theories as a guiding lens in IS research is significant and helps define constructs and variables for the research (Lim et al., 2009). DT Research is situated in IS and requires theories to help guide the research. Extant literature is skewed towards more conventional and popular IS theories, some of which are reviewed in Section 3.3.1. Tavakoli and Schlagwein (2016) express the view that conventional and traditional theories are reaching their limits in explaining new phenomena of IT-enabled work practices, including DT. Therefore, other new or less-used theories suited for IT-enabled phenomena are recommended (Tavakoli & Schlagwein, 2016).

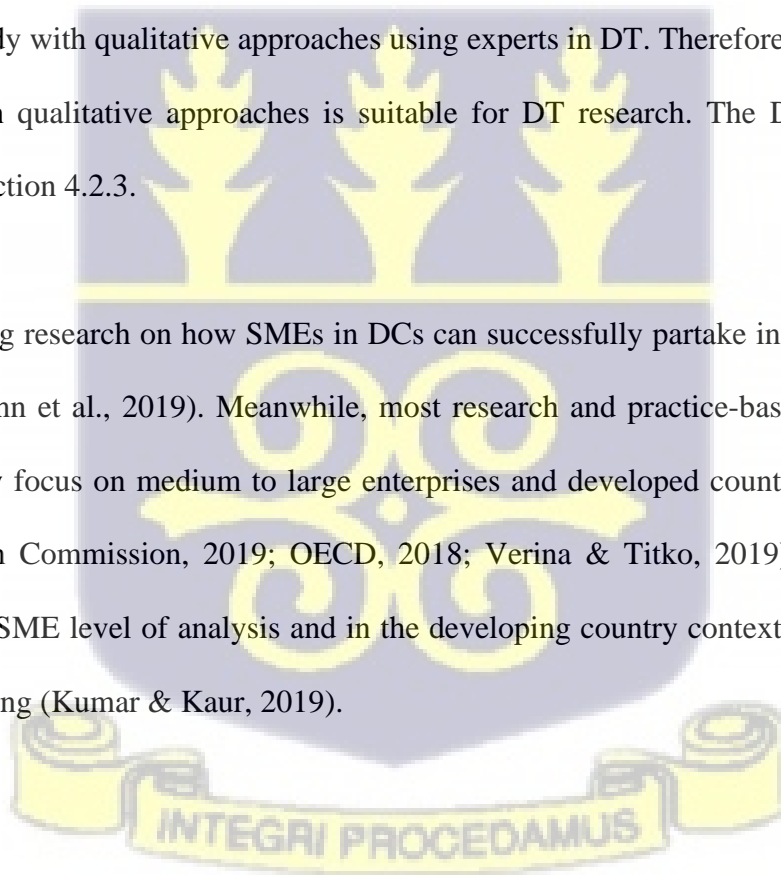
Adaptive Structuration Theory (AST) is an established and significant theory in IS that suits IT-enabled phenomena where the interaction of technology and organisational structures is critical (Pari et al., 2020; Tavella et al., 2021). Therefore, AST is suitable for DT research since DT also involves the interaction of technologies and organisations. Meanwhile, AST has been employed in several IS research in recent times, but very few relate to DT (e.g., Ko et al., 2021; Thapa et al., 2020). Despite the potential of AST, its scanty utilisation in DT, particularly for SMEs, calls for its application in this study.

AST requires direct interaction of the technology and organisation structures that produce other new and emergent sources of structures, which further results in decision processes and outcomes (DeSanctis & Poole, 1994; Tavella et al., 2021). Meanwhile, DT involves precisely the same phenomenon where organisations interact with digital technologies through defined processes and result in outcomes, hence the suitability of AST for this study. The AST is reviewed in Section 3.4.

*Sixth*, in terms of methodology, very few studies on DT use approaches such as the DSR method (Cruz & da Cruz, 2020; Majdalawieh & Khan, 2022) and Delphi methods, particularly the qualitative Delphi method (Cech & Tellioglu, 2019; Sahu et al., 2018). However, most DT studies use case study and survey methods and techniques with qualitative and quantitative research approaches (Garzoni et al., 2020; Kutzner et al., 2018; Priyono et al., 2020). That notwithstanding, more varying approaches and methods are recommended for DT research due to its dynamic and disruptive nature (Kutzner et al., 2018).

Delphi methods, particularly qualitative approaches, are barely used in DT research (Savastano et al., 2019). Meanwhile, DT involves specialised knowledge, which can be unearthed through exploratory study with qualitative approaches using experts in DT. Therefore, utilising Delphi techniques with qualitative approaches is suitable for DT research. The Delphi method is discussed in Section 4.2.3.

*Seventh*, existing research on how SMEs in DCs can successfully partake in DT is lacking in literature (Barann et al., 2019). Meanwhile, most research and practice-based investigations into DT usually focus on medium to large enterprises and developed countries (Bloomberg, 2018; European Commission, 2019; OECD, 2018; Verina & Titko, 2019). Therefore, DT research at the SME level of analysis and in the developing country context is called for and worth undertaking (Kumar & Kaur, 2019).



*In summary*, this study's literature review unearthed four issue gaps, one theory gap, one method gap and one context gap as follows:

- i. The lack of agreement on what constitutes the drivers, processes, and outcomes of DT.
- ii. The lack of studies on the relationships and influences among the drivers, processes, and outcomes of DT in SMEs.
- iii. The silence of studies on how the capabilities and capacities of SMEs influence DT.
- iv. The lack of a theoretically grounded and practice-oriented framework for DT of SMEs.
- v. The lack of evidence on the Adaptive Structuration Theory as a guiding lens theory for DT research.
- vi. The lack of studies that use the qualitative Delphi technique in DT research methodology.
- vii. The limitation in the literature on the DT research involving SMEs in DCs.

*Finally*, this study acknowledges and focuses on the need for what constitutes DT drivers, processes and outcomes (*first gap – issue based*) and their relationships (*second gap – issue based*), and SMEs capabilities and capacities influence (*third gap – issue based*). These gaps form the basis of this study's purpose, and their conceptualisation helps achieve the need for framework development (*fourth gap – issue based*). The study draws on the guiding lens of the Adaptive Structuration Theory (*fifth gap – theory-based*) and uses the qualitative Delphi technique as the methodology (*sixth gap – method based*). The study is conducted in the context of SMEs in DCs' (*seventh gap – context-based*) to conceptualise the DT drivers, processes, and outcomes with SMEs capabilities and capacities toward framework development.

Therefore, this doctoral study's research purpose, objectives, and questions are based on the first three gaps. Still, the study eventually develops a framework that combines these three gaps.

### 1.3 Research Purpose

In light of the above research background and research problem, and to address the research gaps enumerated, the following research purpose is derived for this doctoral study:

*"To explore the drivers, processes and outcomes of DT and the inter-relationships among them, while considering the influence of the SMEs capabilities and capacities in DCs."*

Determining what constitutes the drivers, processes, and outcomes of DT and how they influence each other while considering the SMEs capabilities and capacities would help understand the concept of DT of SMEs in DCs. Furthermore, conceptualising these factors with framework development can increase the boundaries of knowledge and theorisation concerning the DT SMEs in DCs.

### 1.4 Research Objectives

In relation to the research problem and purpose, the following research objectives are set:

- i. *To determine the drivers, processes, and outcomes of the DT of SMEs in DCs.*
- ii. *To examine the influences among the drivers, processes, and outcomes in the DT of SMEs in DCs.*
- iii. *To understand the influence of SMEs capabilities and capacities on the drivers, processes, and outcomes of the DT in DCs.*

This first research objective responds to the lack of agreement on the drivers, processes, and outcomes of SMEs' DT in DCs, as explained in Chapter One, Section 1.3 (Liere-Netheler et al., 2018). It also addresses the need for periodic reviews of the drivers and other factors due to the dynamic nature of the DT phenomenon and organisations (Solis & Littleton, 2017).

The second objective addresses the inadequate literature on the relationships among the drivers, the processes, and the outcomes, as explained in Chapter One, Section 1.3 (Liere-Netheler et al., 2018; Hrustek et al., 2019). It also addresses the need to understand the possible influences of DT drivers on processes, drivers on outcomes, processes on outcomes, and outcomes on drivers. Hrustek et al. (2019) and Li (2020) suggest that different drivers may result in unique processes and outcomes like business models.

The third objective addresses the silence of current studies on how the capabilities and capacities of firms influence the DT drivers, processes, and outcomes, as explained in Chapter One, Section 1.3 (Hanelt et al., 2021; Li et al., 2018; Morakanyane et al., 2017; Savastano et al., 2019; Vial, 2019). It also addresses the need to examine the capabilities and capacities of SMEs that interplay in the DT of SMEs in DCs (Hausberg et al., 2018; Li et al., 2018; Nadeem et al., 2018; Solis & Littleton, 2017).

## 1.5 Research Questions

In responding to the research purpose and objectives, the following research questions are asked:

- i. *What are the drivers, processes, and outcomes of the DTs of SMEs in DCs?*
- ii. *How do the drivers, processes and outcomes influence one another in the DT of SMEs in DCs?*
- iii. *How do the SMEs capabilities and capacities influence the DT drivers, processes, and outcomes in DCs?*

The first question is addressed through the *conceptualisations of the drivers, processes, and outcomes* obtained from the Adaptive Structuration Theory (AST) and extant literature on the DT of SMEs in DCs (Giddens, 1984; Kane et al., 2017; Paavola et al., 2017). The conceptualisations are discussed, and the derived categories are shown in Chapter Three, Section 3.5.

This second research question is addressed by examining the drivers, processes, and outcomes' inter-relationships and frameworks established to conceptualise the relationships and influences among the drivers, processes, and outcomes of the DT of SMEs in DCs. The frameworks are discussed and shown in Chapter Three, Section 3.5.

This third research question draws on the '*capability and capacity framework*' harnessed from extant literature (e.g., Ambrosini & Altintas, 2019; Helfat & Martin, 2015; Helfat & Winter, 2011) in combination with the *driver, process, and outcomes framework* to conceptualise the SMEs capabilities and capacities' influence on DT in DCs. The frameworks are discussed and shown in Chapter Three, Section 3.5.

All three research questions are addressed with the Qualitative Delphi method, identified as a gap in Chapter One, Section 1.3 (Cech & Tellioglu, 2019; Kutzner et al., 2018; Savastano et al., 2019). Data is collected from DT experts in six DCs and analysed using a data analysis process framework developed for the study and based on Bazeley (2009), Gioia et al. (2013) and Strauss (1987). The methodological research strategy, data collection and analysis are discussed in Chapter Four.

## 1.6 Research Context

The contextualisation of this study aligns with the principle that IS research, and practice must associate technology innovation with the context within which it is embedded (Avgerou, 2011). The principles are that (1) technology innovation should be considered in relation to socio-organisational change; (2) analysis should consider not only the local and organisational context but also the national and international context; and (3) analysis should consider both the technical and rational decisions and actions involved in the innovation processes, and the cultural, social and cognitive forces of such processes. With these principles, this section outlines and describes the various contexts within which this study is conducted.

*First, the geographical and developmental context* of this study is DCs, also referred to as Developing Economies (DEs), which are nations whose economies have low gross national income (GNI) per-capita (Nielsen, 2011; Roztocki & Weistroffer, 2009; Serajuddin & Hamadeh, 2020). Gross national income (GNI) is defined as gross domestic product plus net receipts from abroad of compensation of employees, property income and net taxes less subsidies on production (OECD, 2021; World Bank, 2022). Meanwhile, GNI per capita is the gross national income divided by the midyear population (OECD, 2021, World Bank, 2022). However, no definition or classification is universally agreed upon for DCs (Abor & Quartey, 2010; Storey, 2016). ‘Developing’ describes a currently observed state or situation, not a changing or dynamic state or expected progress direction. Countries and territories are classified based on geographical regions and income levels by the World Bank and other international organisations (Roztocki & Weistroffer, 2009; World Bank, 2020).

In terms of *income levels*, the classifications are *low-income*, *lower middle-income*, *upper middle-income*, and *high-income economies*. The income level categories are determined by

the gross national income per capita of the countries calculated using the World Bank Atlas method (World Bank, 2020). As of 2022, low-income economies are defined as those with a GNI per capita of \$1,085 or less; lower-middle-income economies are those with a GNI per capita between \$1,086 and \$4,255. Upper-middle-income economies are those with a GNI per capita between \$4,256 and \$13,205; high-income economies are those with a GNI per capita of \$13,205 or more (World Bank, 2022).

Meanwhile, the countries in all the categories except the high-income economies are considered developing economies or DCs (World Bank, 2020). Regarding *geographical regions*, the classifications are *North America, Europe and Central Asia, East Asia and Pacific, South Asia, Latin America and the Caribbean*, and *Sub-Saharan Africa* (World Bank, 2020). However, the DCs are found in all but the North American region (World Bank, 2020). The DCs can further be grouped according to economic growth or size of the capital market as Newly Industrialised Countries, Emerging Markets, Frontier Markets, and Least Developed Countries (LDC) (Roztocki & Weistroffer, 2009; Serajuddin & Hamadeh, 2020).

The classifications of the countries selected for this study based on the geographical regions are Sub-Saharan Africa (Ghana, Nigeria, Kenya, South Africa), East Asia and Pacific (China), and South Asia (India). In terms of income, these countries belong to the lower middle income (Ghana, Nigeria, Kenya, India) and upper middle income (China, South Africa).

DCs have low infrastructure development and low technological capacity (Nielsen 2011). DCs typically exhibit low living standards and have underdeveloped industrial and commercial foundations. In contrast are the developed countries, characterised by lofty standards of living, ongoing and self-sustaining economic growth, and a well-developed infrastructure (Roztocki

& Weistroffer, 2009). DCs are less endowed and more vulnerable than developed countries regarding managerial and organisational capabilities and capacities (Serajuddin & Hamadeh, 2020). Hence relative to DT, firms in DCs experience more challenges, particularly SMEs.

*Second, the level of analysis context* of the study is at the SME level or organisational level (*meso level*). However, the views are from individual DT experts' level (*micro level*) whose perspectives are from different countries (*macro level*). That notwithstanding, the focus of the exploration of DT in this study is SMEs in DCs (*meso level*). SMEs are businesses or firms with total revenues, assets, or number of employees below a certain threshold (OECD, 2019). SMEs' revenues, assets, or employee thresholds vary for countries and industries. In some cases, the ownership structure, the number of employees, earnings, and industry type contribute to SMEs' definitions. However, a standard or universal definition of SMEs does not exist (Abor & Quartey, 2010; Storey, 2016).

Meanwhile, there are different definitions of SMEs for different jurisdictions across countries in the world. The different definitions are apparent because the dimension of “small” and “medium” for a firm are comparative to the size of the domestic economy and the type of industry (Kushner, 2010; Storey, 2016). For statistical purposes, SMEs are denoted as firms that employ a maximum of 249 persons, with further categorisation as *micro* (1 to 9), *small* (10 to 49), and *medium* (50-249) employee sizes (OECD, 2017). This breakdown offers the best comparative explanation for SMEs as different countries use different conventions.

SMEs play critical roles in the economies of most countries, if not all. SMEs contribute to job creation and offer high employment levels, particularly in developing countries (Abor & Quartey, 2010; Wang, 2016). Notwithstanding SMEs being drivers of economic growth and

constituting the most dynamic firms in emerging economies, SMEs face several obstacles which can impede their DT (Prange & Zhao, 2018). SMEs are characterised by limited access to finance and are exposed to high finance costs (Wang, 2016). Inadequate infrastructure, lower capabilities and capacities, and high competition are the typical characteristics of SMEs (Wang, 2016). These characteristics challenge SMEs and inhibit SMEs' digitalisation and DT attempts (Boneva, 2018; Ndiaye et al., 2018).

*Third*, this study's *theoretical context* and perspective consider the guiding lens of AST. AST is used to study information technology interaction with groups or organisations (DeSanctis & Poole, 1994). This study's context is the interaction of digital technologies with organisations or enterprises. The primary independent constructs are the digital technologies' structural features and spirit features, work tasks, external environment, internal system, new rules and resources, and outputs of technology-organisation interaction (DeSanctis & Poole, 1994).

The *structural features* are particular types of capabilities, resources, attributes or rules presented by the system. They control precisely how users can collect, manipulate, and handle information. The *spirit* features are the overall intentions regarding goals and values fundamental to the structural features. Spirit represents the technology as it is reflected in the mind of the users. Regarding spirit features, there is more emphasis on the technology's objectives and values than the physical features and appearance (DeSanctis & Poole, 1994).

Therefore, AST delineates DT drivers and shows how they interact with the organisation through the appropriation of structure and structuration. Decision processes then occur, resulting in outcomes of quality and effectiveness of the digital technology and the consensus and commitment of personnel and organisation. AST is appropriate for DT because it

highlights all drivers of DT from both technological and organisational perspectives while focusing on their interactions. The interactions reflect the DT processes, which bring about the transformation and finally result in the DT outcomes.

*Fourth, the philosophical context* of this study is the critical realism (CR) philosophy. CR is a suitable research paradigm to unearth phenomenon that needs to be explored in information systems research (Bygstad et al., 2015). The main objective of using CR in research is to use the perception of empirical phenomena or events, both observed and experienced, to identify the mechanisms that give rise to the phenomena or events.

This study concerns unearthing the DT drivers, processes and outcomes while exploring their interactions and the effects of SMEs capabilities and capacities. This aim calls for a research paradigm with an epistemological focus of unearthing a phenomenon's generative mechanisms. Hence the use of CR is justified since DT drivers, processes, and outcomes are types of mechanisms of the DT phenomenon. Consequently, this study adopts the Critical Realism research paradigm.

*Fifth, the methodological context* of this study is the use of the qualitative Delphi technique. The Delphi method is prevalent in IS research (Cech & Tellioglu, 2019; Hartl & Hess, 2017; Skinner et al., 2015; Strasser, 2017). Its use results from its robustness and reliability because it requires expert opinion through consensus without conferring (Brady, 2015; Fletcher & Marchildon, 2014; Fletcher & Marchildon, 2018; McPherson et al., 2018). The qualitative aspect is suitable for new and emerging phenomena like DT. Meanwhile, DT constitutes a specialised knowledge area where expert opinions are relevant, reliable, and valid. This DT research requires that experts be engaged to provide accurate insights about DT drivers,

processes, and outcomes and how they relate and can be influenced. Therefore, the Delphi technique was very suitable for this study.

## 1.7 Research Significance

The significance of this study is established in its contribution to knowledge and IS literature as it explores the drivers, processes and outcomes of DT and the relationships among them while considering the influence of the capabilities and capacities of SMEs in DCs. The significance of this study is considered in terms of research, practice and policy.

In terms of *research*, the study utilises the AST to develop a conceptual framework that helps explore and unearth DT's drivers, processes, and outcomes. Beyond determining these factors, the study reveals significant relationships and shows how SMEs' capability and capacity influence them. Regarding the drivers of DT, their different dimensions and their influences on processes and outcomes are identified in this study that hitherto was virtually absent in the literature but significant for DT (Al Maamari & Bhuiyan, 2021; Lutfi et al., 2022). The study also delineates the stepwise and adaptable processes for DT in a manner that collectively has no precedence in literature (Priyono et al., 2020; Delgado, 2017). These processes lead to the dimensions of DT outcomes representing outcome types in extant literature (Bui, 2021; Chen et al., 2016; Lukonga, 2020; Mahmood et al., 2019).

These factors and typologies of drivers, processes and outcomes and their relationships are explored with the study's developed theoretical and practice-based DT framework. The framework contributes to research that seeks to understand the relationships and influences, as such studies lack in the literature (Liere-Netheler et al., 2018; Hrustek et al., 2019; Reis et al.,

2018). Beyond the relationships among the factors, the framework also helps identify the implying capabilities and capacities and how they influence the drivers, processes and outputs.

Regarding *practice*, the study is significant in categorising and detailing the interplay of the typologies of drivers, processes, outcomes, capabilities, and capacities in DT. These typologies help entrepreneurs, managers, and employees appreciate and understand their DT endeavours. DT literature argues that “DT is not a light endeavour which organisations can pursue blindly and unprepared” (Delgado, 2017, p. 3). The significance of the theoretical and practice-based framework is therefore obviously important.

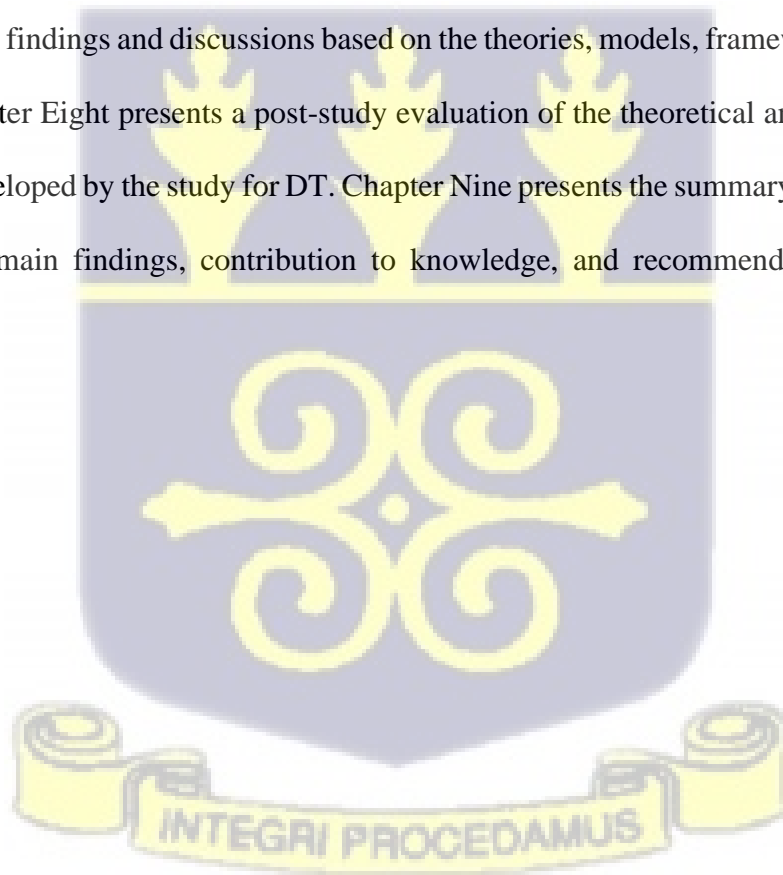
Concerning *policy*, the study is significant in guiding stakeholders such as government, regulators, industry groups and other interest bodies to appreciate what drives or motivates DT. It also guides the processes needed to achieve DT and the anticipated outcomes of successful DT for SMEs (Handoko et al., 2019). Policymakers will also appreciate how managerial and organisational capabilities and capacities could influence SMEs' DT drivers, processes, and outcomes. Thus, this study's findings can help improve decision-making and DT policies for SMEs operating in DCs strategically.

## **1.8 Chapter Organisation**

This section presents an outline of the chapter organisation of the study. The study report is organised into nine (9) chapters. Chapter One introduces the study's background, research problem, purpose, objectives, questions, context, and significance. Chapter Two presents the literature review on DT research, highlighting the key concepts of DT, digital technologies in DT, DT drivers, processes, outcomes, SMEs capabilities and capacities, DT of SMEs in DCs,

and a summary of research gaps of interest. Chapter Three discusses the study's theoretical foundations and research framework, considering explanations of theory, model, and theoretical and conceptual frameworks. Chapter Four presents the methodology involving the research strategy (philosophy, approach, design, sampling), data collection, analysis, validity, and reliability.

The study's findings are presented in Chapter Five, clustered according to the objectives and the themes obtained from the analysis. Chapter Six discusses the study's findings relating to digital technologies, drivers, processes, outcomes, capabilities and capacities and their relationships and influences. Chapter Seven presents the development of the DT frameworks from the study's findings and discussions based on the theories, models, frameworks, and extant literature. Chapter Eight presents a post-study evaluation of the theoretical and practice-based framework developed by the study for DT. Chapter Nine presents the summary and conclusions of the study's main findings, contribution to knowledge, and recommendations for future research.



## CHAPTER TWO

### 2 REVIEW OF DIGITAL TRANSFORMATION LITERATURE

#### 2.1 Chapter Overview

This study reviewed the available and relevant literature to advance knowledge and uncover new research areas on DT. This chapter presents the review in nine sections. The first section sets the tone by showing the methodology for the review. The second section conceptualises the key concepts and terms in DT, while the third discusses DT's digital technology trends and types. The fourth, fifth and sixth sections present vital issues in advancing DT research as the DT drivers, DT processes and DT outcomes, respectively. The seventh section considers the SMEs capabilities and Capacities for DT, whereas the eighth section presents the DT of SMEs in DCs. The ninth section summarises the research gaps.

#### 2.2 Literature Review Methodology

This study's literature review followed a Systematic Literature Review (SLR) approach. SLR is a type of research that uses systematic methods to collect secondary data, critically appraise research and synthesise studies (Ham-Baloyi & Jordan, 2016). The main reason for using this approach is to provide a comprehensive summary of current studies relevant to DT conceptualisation (Levy & Ellis, 2006). SLR is considered suitable for research on digital entrepreneurship and DT (Pittaway & Cope, 2007). The SLR approach manages numerous research articles on the topic in focus over a period, and the basic principles provide acceptable transparency and replicability (Armitage & Keeble-Allen, 2008).

The literature search was conducted using credible and relevant electronic databases as sources. The quest was performed in eight (8) databases: namely, ScienceDirect/Elsevier, Emerald, AIS Library, Sage, Springer, and Taylor and Francis, EBSCOHost and Willey Online. Some search was also done using Google Scholar; however, most articles retrieved also belonged to some of the journals abstracted in the listed databases. These databases may not list or abstract all the relevant journals that would manage DT articles. Nevertheless, they have multidisciplinary journals covering IS and social research that suit the DT concept. Most of these databases have top-ranked journals, useful for IS and multidisciplinary research globally, making the list of databases fair and adequate (Levy & Ellis, 2006).

DT was the primary descriptor or search phrase used for all the searches. Other keywords included digitalisation, digital innovation, digital entrepreneurship, digital technologies, SMEs, and DCs. The searches were limited to research articles and anecdotal articles published between 2010 and 2020. The reference list and citations in some retrieved articles were also examined. This approach led to some relevant and seminal research articles, yet valuable beyond the specified search period. The selected articles were manually scrutinised and subjected to inclusion and exclusion criteria. Most of the articles included were peer-reviewed journal articles and book chapters; however, some anecdotal papers were accepted because DT is a practice-based phenomenon; hence, several papers are presented as anecdotes and typical viewpoints.

Meanwhile, the thesis and dissertations were not accepted, together with anecdotes from irregular and non-institutional websites. The abstracts were read, and the articles were skimmed through to eliminate duplicates and ensure they focused on the DT-related search descriptors, not their mere mention. Efforts were made to ensure the selected papers focused on DT's critical

issues concerning the drivers, processes, outcomes, and SMEs capabilities and capacities influence. Furthermore, papers on issues concerning DT, digital technologies, innovation, entrepreneurship, SMEs, and DCs were also selected. Both empirical and conceptual papers were considered relevant.

Finally, 282 articles and papers were selected and subjected to classification based on drivers, processes, outcomes of DT, and the capabilities and capacities' influence. They were also classified based on the research theories and methodologies used, the level of analysis, and the context. The review write-up was based on these classifications of themes, methodologies, theories, context, and level of analysis. Future research themes and perspectives for future research and those less researched were also noted and presented in evidence as gaps.

### **2.3 Conceptualising the Key Concepts in DT**

The DT concept has been frequently associated with other terms and concepts (Heavin & Power, 2020). Meanwhile, IS literature has widely used and diversely defined or explained these terms (Verhoef, 2021). The common factor in these concepts is digital technologies, and scholars often conceptualize the implications and processes of utilising digital technologies as digitisation, digitalisation, digital innovation, and DT (Frenzel et al., 2021). Indeed, these concepts are interconnected, but they are distinct at the conceptual level. This section conceptualises and explains these related concepts.

### 2.3.1 Digitisation

Legner et al. (2017, p. 301) describe digitisation as “the technical process of converting analogue signals into a digital form, and ultimately into binary digits.” Other definitions of digitisation also exist with varying approaches and understanding, as presented in Table 2.1.

**Table 2.1 Definitions of Digitisation**

Source(s)	Definition and Concept for Digitisation	Derived Understanding
Legner et al. (2017, p. 301)	“The technical process of converting analogue signals into a digital form, and ultimately into binary digits (bits).”	Conversion of analogue data to digital. Explicit difference between digitisation and digitalisation
Sandberg et al. (2020)	Change in a firm’s organising logic by instilling new properties into product platforms	Digitisation influences product architectures. The final stage of digitisation is a platform-ecosystem
Bloomberg (2018)	Taking analogue information and encoding it into zeroes and ones so that computers can store, process, and transmit such information	Conversion of analogue data to digital
Brennen & Kreiss (2016)	The material process of converting individual analogue streams of information into digital bits	Conversion of analogue data to digital

The definition of digitisation as a technical process that transfers analogue signals into digital signals (data conversion) is touted by several authors (Bloomberg, 2018; Brennen & Kreiss, 2016; Tilson et al., 2010). This definition implies the evolutionary processing of data, with the analogue form being a prerequisite for the final digital product evolving out of it. However, in the contemporary era, in most instances, there is no longer a need for an analogue version, as data or even contextualised information can be created independently and solely in digital form (Baskerville et al., 2020). For example, a text document processed on a computer does not need to be handwritten in advance. Therefore, digitisation can imply the fully digital creation of information and data with or without a physical or analogue counterpart. On the other hand, Sandberg et al. (2020, p. 130) introduce a platform dimension and describe digitisation as a "change in a firm’s organising logic by instilling new properties into product platforms."

### 2.3.2 Digitalisation

*Digitalisation* is the use and application of digital technologies in the contexts of individuals, organisations, or society (Frenzel et al., 2021). Legner et al. (2017) and Sandberg et al. (2020) further describe digitalisation as “the manifold socio-technical phenomena and processes of adopting and using digital technologies in broader individual, organisational, and societal contexts” (Legner et al. (2017, p. 301). Other definitions of digitalisation are presented here in Table 2.2.

**Table 2.2 Definitions of Digitalisation**

Literature Source(s)	Definition and Concept of Digitalisation	Derived understanding
Legner et al. (2017)	“The manifold socio-technical phenomena and processes of adopting and using digital technologies in broader individual, organisational, and societal contexts”	Socio-technical nature (human, organisation and material related)
Tilson et al. (2010, p 2)	“A socio-technical process of applying digitising techniques to broader social and institutional contexts that render digital technologies infrastructural”	Socio-technical process and not an event. Digital technology is key
Corrocher and Ordanini (2002)	“The emergence of technological platforms of information and communications technology determined significant and unprecedented changes in many aspects of our social and economic life”	Mentions a platform dimension, restricting the application
Frenzel et al. (2021)	“The use and application of digital technologies in the contexts of individuals, organisations, or society at large”	The use of technologies emphasised
Brennen and Kreiss (2016)	The way in which many domains of social life are restructured around digital communication and media infrastructures	Digital changing social

Most of the definitions of digitalisation reflect its socio-technical attributes. Moreover, emphasis is placed on the involvement and use of digital technologies (Frenzel et al., 2021; Tilson et al., 2010). Brennen & Kreiss (2016) describes digitalisation as how domains of social life are restructured around digital communication. Besides not showing outcomes, this definition does not indicate digital technologies but digital data.

Digitisation is considered a technical requirement for digitalisation, where digitalisation is a form of digital technology-enabled social change (Mihailescu & Mihailescu, 2018; Tilson et

al., 2010). However, Corrocher and Ordanini (2002) also introduce a platform dimension, restricting its application and focus to platforms that change social and economic life. Meanwhile, none of the definitions implies a fundamental change to the organisation or society, distinguishing it from DT (Alt, 2018).

### 2.3.3 Digital Innovation

The dimension of digitalisation that results in the creation of new businesses is described as *digital innovation* (Frenzel et al., 2021). Digital innovation is “the application of digital technologies, platforms, and infrastructure to propose a new way of offering service to a customer to enhance customer value proposition” (Ciriello et al., 2018). Some other definitions from extant literature are presented in Table 2.3.

**Table 2.3 Definitions of Digital Innovation**

Literature Source(s)	Definition and Concept of Digitalisation
Nambisan et al. (2017)	The use of digital technology during the process of innovation or denotes the outcomes of the innovation is wholly or partly digital
Hund et al. (2021)	The creation, adoption, and exploitation of an inherently unbounded, value-adding novelty (e.g., product, service, process, or business model) through digital technology.
Barrett et al. (2015)	New combinations of digital and physical components to produce new products (and services) by combining digital data from heterogeneous sources effortlessly ‘to deliver diverse services, which dissolves product and industry boundaries
Markus and Nan (2020)	(As a verb) The innovation processes involving sociotechnical combinations of digital technologies and complementary material and ideational resources (As a noun) The direct outcomes of that innovation process, such as the creation, introduction, and use of a new product, process, or business model

### 2.3.4 Digital Transformation

The term DT has been so used (or misused) and differently defined (or explained) to the extent that it becomes very confusing (Gong & Ribiere, 2021). Digital transformation results from digitalisation and is concerned with adopting and using information and digital technologies to

change various aspects of organisations and society. The transformation ranges from changing business models to improving existing organisational processes and customer experience (Priyono et al., 2020).

**Table 2.4 Definitions of Digital Transformation**

Literature Source(s)	Definition and Concept of Digital Transformation	Challenges
Westerman et al. (2011, p 5).	“The use of technology to radically improve the performance or reach of an enterprise.”	Definition with conflation problems
Fitzgerald et al. (2014, p. 2)	“The use of new digital technologies (social media, mobile, analytics or embedded devices) to enable major business improvements (such as enhancing customer experience, streamlining operations, or creating new business models).”	Definition with conflation problems and Conceptual stretching.
Brown et al. (2014)	DT encompasses everything from the cultural and organisational changes required to the related use of new digital technologies to enable major improvements – such as enhancing user services, streamlining operations, or creating entirely new services.	
Piccinini et al. (2015, p. 7)	DT involves “leveraging digital technologies to enable major business improvements, such as enhancing customer experience or creating new business models.”	
Paavola et al. (2017, p 2)	“The use of new digital technologies to enable major business improvements in operations and markets such as enhancing customer experience, streamlining operations or creating new business models.”	
Ismail et al. (2017, p. 6)	“The process through which companies converge multiple new digital technologies, enhanced with ubiquitous connectivity, to reach superior performance and sustained competitive advantage, by transforming multiple business dimensions, including the business model, the customer experience, and operations, and simultaneously impacting people and networks.”	Vague term
Solis (2019)	“The evolving pursuit of innovative and agile business and operational models, fuelled by evolving technologies, processes, analytics and talent, to create new value and experiences for customers, employees and stakeholders.”	The conflation between the concept and its expected outcome
Mičić (2017, p. 135)	“The integration of digital technology into the business that results in, sometimes fundamental, changes in business operation and delivery of value to customers.”	
Van Veldhoven and Vanthienen (2019, p. 754).	“The continuously increasing interaction between digital technologies, business, and society, which has transformational effects and increases the change process’s velocity, scope, and impact.”	Circularity between concept effects. and impact
Gong and Ribiere (2021, p. 12)	A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders	Encompassing definition with cause and effect

The key concepts in DT are that digital technologies are used, resulting in new business systems or modification of business systems to meet customer demand or improve firms’ operational

efficiency. According to Gobble (2018), DT results in profound changes in business and organisational processes, activities, competencies, strategies, and models. In this study, DT is viewed from a holistic perspective to include changes in products, processes, communications, transactions, human resources, and overall business operations informed by adopting digital technology software, platforms, or systems. According to Ismail et al. (2017), DT integrates digital technologies into all business areas, changing firms' value delivery to customers. In DT, organisations may be required to continually challenge the status quo due to a cultural change to improve service delivery and operational efficiency.

Therefore, further aspects of digitalisation that exceed influence, such as the evolution of new and existing business models, get into digital innovation and DT (Bouwman et al., 2019; Frenzel et al., 2021). Finally, DT can be defined as “A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders” (Gong & Ribiere, 2021, p. 12). In summary, DT is firms' operational and organisational changes resulting from the adoption and utilisation of digital technologies and digitalisation as a strategy. This definition guides this study.

### **2.3.5 IT-Enabled Transformation**

DT should be distinguished from IT-enabled Transformation (ITT) (Markus & Benjamin, 1997). ITT is also described as IS-enabled Transformation (Cooper & Molla, 2017), IT-enabled organisational transformation (Cha et al., 2015; vom-Brocke et al., 2021) or IT-enabled business change (Ward & Elvin, 1999). DT and ITT may have several similarities but differ regarding their key activities and outcomes.

DT involves using digital technology to (re)define a value proposition and to change the firm's identity (Wessel et al., 2021). On the other hand, ITT involves using digital technology to support an existing value proposition and reinforce an existing organizational identity (Wessel et al., 2021). Therefore, DT activities leverage digital technology in (re)defining an organization's value proposition, whereas ITT activities leverage digital technology in supporting the value proposition. Also, while DT involves the emergence of a new organizational identity, ITT enhances an existing organizational identity (Wessel et al., 2021).

## 2.4 Digital Technology Trends and Types in DT

Digital technologies seem not to have an agreed definition. However, Yoo et al. (2010) provide three characteristics that define digital technologies and distinguish them from analogue technologies. The characteristics are (1) the re-programmability, (2) the homogenisation of data, and (3) the self-referential nature of digital technology (Yoo et al., 2010). They further propose an architecture of digital technologies with four layers: device, service, network, and content (Yoo et al., 2010). New development trends involve implementing new digital technologies under the common name of Industry 4.0 or the Fourth Industrial Revolution (Schwab, 2017). Categories presented by Schwab (2017) that contribute to DT include the wearable internet, the internet of things, smart cities, big data, driverless cars, robotics, sharing economy, and 3D printing.

Digital technologies employed in DT have also been categorised and described with the acronym SMACIT (Sebastian et al., 2017). SMACIT refers to technologies related to *social* (Li et al., 2018), *mobile* (Hanelt et al., 2015), *analytics* (Günther et al., 2017), *cloud* (Ezeokoli et al., 2019), and the *internet of things* (IoT) (Petrikina et al. 2017). Other categories are

platforms (Tan et al., 2015), the *internet* (Lyytinen & Rose, 2003), *software* (Ulas, 2019), and *blockchain* (Glaser, 2017). Meanwhile, combinations of technologies are particularly relevant in DT (Günther et al., 2017). Table 2.5 presents the digital technology categories involved in DT.

**Table 2.5 Digital Technology Trends and Types DT**

Category of Digital Technologies	Technologies in DT	Reference	The highlight of DT in SMEs of DCs	Key Gaps
Mobile Computing	Mobile	Al Maamari and Bhuiyan (2021), Ezeokoli et al. (2019), Sebastian et al. (2017), Ulas (2019)	DT factors for efficiency (Al Maamari & Bhuiyan, 2021).  DT trend readiness (zeokoli et al., 2019).	Lack of studies on trends and types of digital technologies in DT
Desktop Computing	Software	Ulas (2019)		
Cloud Computing	Cloud	Khayer et al. (2020), Yoo and Kim (2019), Sebastian et al. (2017), Titko (2019), Ulas (2019)	Cloud computing adoption and its impact on SMEs' performance (Khayer et al., 2020)	
Platforms	Sharing economy	Pihir et al. (2019), Schwab (2017), Ulas (2019)	DT of SMEs via a digital platform service provider (Li et al., 2017)	
	Social	Al Maamari and Bhuiyan (2021), Li et al. (2017), Sebastian et al. (2017)		
	Platforms	Tan et al. (2015)		
	Internet	Lyytinen and Rose (2003)		
Artificial Intelligence (AI)	Robotics	Pihir et al. (2019), Schwab (2017), Chatterjee et al. (2021)	Internet of Things (IoT) and digital platforms for SMEs DT (Yousaf et al., 2021).	
	Internet of things	Pihir et al. (2019), Petrikina et al. (2017), Schwab (2017), Sebastian et al. (2017), Yousaf et al. (2021)	Role of AI for DT of SMEs in India (Chatterjee et al., 2021).	
Analytics	Big data	Ezeokoli et al. (2019), Ogbuokiri et al. (2015), Pihir et al. (2019), Schwab (2017), Titko (2019), Ulas (2019)	DT trend readiness (Ezeokoli et al., 2019).	
	Analytical	Günther et al. (2017), Ogbuokiri et al. (2015), Sebastian et al. (2017)	Big data Analytics for SMEs (Ogbuokiri et al., 2015).	
Others	Blockchain	Glaser (2017), Titko (2019), Ulas (2019)		
	3D printing	Pihir et al. (2019), Schwab (2017), Ulas (2019)		

The nature of digital technologies is a fundamental factor causing the dramatic shift within organisations and in the competitive landscape. The convergence of multiple technologies, such as mobile, location-based, virtual reality, blockchains, artificial intelligence (AI), chatbots, platforms and cloud computing, is driving DT today (Zaki, 2019). According to Ulas (2019), digital technologies are the driving factors that expedite DT among SMEs. Many examples are mentioned, including mobile computing, cloud computing, and sharing platforms (Ahmad et al., 2019; Ulas, 2019). Yousaf et al. (2021) discuss the impact of digital technologies and platforms on SMEs in DCs. Furthermore, for the effects of digital technologies on SMEs in DCs, Chatterjee et al. (2021) emphasise AI and IoT, while Ogbuokiri et al. (2015) focus on Big Data and Analytics. All these digital technologies presented in Table 2.5 are significant for the DT of SMEs in DCs.

## 2.5 Drivers of DT

Drivers of DT have been defined as attributes that influence and enable the occurrence of DT (Morakanyane et al., 2017). To simplify the definition, Lammers et al. (2019) also describe DT drivers as facilitators and enablers of DT. Meanwhile, Liere-Netheler et al. (2019) define drivers as preliminaries and/or expectations about future benefits that positively trigger and influence DT's (pre)adoption processes. Moreover, DT drivers have also been described as a determinant of DT, implying they determine the occurrence of DT (Lammers et al., 2019; Pihir et al., 2018; Hrustek et al., 2019). These definitions suggest that outcomes of DT may have the effect of driving DT. Nevertheless, no literature classifies outcomes as drivers.

Various categories, types, and sources of DT drivers are extensively discussed in the extant literature, including reviews of what constitutes DT drivers (e.g., Berghaus & Back, 2017;

Hrustek et al., 2019; Liere-Netheler et al., 2018; Morakanyane et al., 2017; Osmundsen et al., 2018). The Drivers of DT are classified differently by different authors in extant literature (Al Maamari & Bhuiyan, 2021; Ismail et al., 2017). However, the drivers identified in extant literature are usually classified into technology-related, internal organisation-related, and external environment-related. A summary of the drivers with their categories, references and gaps is presented in Table 2.6.

**Table 2.6 Drivers of DT**

Category of Driver Source	Driver	Reference	The highlight of DT in SMEs of DCs	Key Gaps
Technology	Technology trends and type	Al Maamari and Bhuiyan (2021), Ezeokoli et al. (2019) Hrustek et al. (2019), Titko (2019), Ulas (2019)	DT factors for efficiency (Al Maamari & Bhuiyan, 2021)	Rapid changes in digital technological features call for periodic review  Lack of agreement on the drivers of DT
	Innovation push	Liere-Netheler et al. (2018)	DT trend readiness (Ezeokoli et al., 2019)	
	Technology features (general affordance)	Alraja et al. (2021), Ismail et al. (2017), Chatterjee et al. (2021)	Drivers of big data analytics in DT (Lutfi et al., 2022)	
	New and emerging technologies	Morakanyane et al. (2017) Nwankpa and Roumani (2016)	Drivers of the digitalisation process of SMEs (Alraja et al., 2021)	
	Functionality and complexity	Nwankpa and Roumani (2016)	Factors influencing DT and the entrepreneurship process (Chatterjee et al., 2021)	
	Customisability, updatability, speed, and agility	Châlons and Dufft (2017) Liere-Netheler et al. (2018) Chatterjee et al. (2021)	DT of business (Schwertner, 2017)	
	Availability and affordability	Osmundsen et al. (2018) Alraja et al. (2021)		
	Security	Lutfi et al. (2022), Schwertner (2017)		
Organisation (Internal system)	Vertical and horizontal integration	Liere-Netheler et al. (2018)	DT factors for efficiency (Al Maamari & Bhuiyan, 2021)	A lack of literature on the internal organisational drivers of DT of SMEs in DCs
	Process improvement	Hrustek et al. (2019), Liere-Netheler et al. (2018), Pihir et al. (2018)	Drivers of big data analytics in DT (Lutfi et al., 2022)	
	Workplace improvement/flexibility/agility	Ismail et al. (2017), Liere-Netheler et al. (2018)	Drivers of the digitalisation	
	Operations, collaboration	Ismail et al. (2017), Taruté et al. (2018)		

	Reduced cost	Hrustek et al. (2019), Ismail et al. (2018), Liere-Netheler et al. (2018)	process of SMEs (Alraja et al., 2021)	
	Profitability, productivity, performance,	Hrustek et al. (2019), Ismail et al. (2017)		
	Management support	Liere-Netheler et al. (2018), Pihir et al. (2018)		
	Employee support/teams Employee demand	Liere-Netheler et al. (2018) Ismail et al. (2017) Tarutè et al. (2018).		
	Vision	Pihir et al. (2018)		
	Management and leadership approaches	Al Maamari and Bhuiyan (2021), Pihir et al. (2018)		
	ICT resource	Lammers et al. (2019) Pihir et al. (2018)		
	Skills, knowledge, capacities, and competence	Lammers et al. (2019), Liere-Netheler et al. (2018) Pihir et al. (2018)		
	Organisational culture structure,	Al Maamari and Bhuiyan (2021), Hrustek et al. (2019) Pihir et al. (2018)		
	Innovation culture	Pihir et al. (2018)		
	Digital capabilities and strategies	Matt, et.al. (2015), Morakanyane et al. (2017)		
	Value creation and New business models	Morakanyane et al. (2017)		
	Organisation (External environment)	Customer behaviour and expectations		
Stakeholder demands		Ismail et al. (2017)		
Changing competitive landscape		Berghaus and Back (2017), Ismail et al. (2017), Piccinini et al. (2015)		
Market pressure		Liere-Netheler et al. (2018)		
Digital shifts in the industry		Berghaus and Back (2017)		
Supply chain		Liere-Netheler et al. (2018)		
Regulative changes / legal / government		Al Maamari and Bhuiyan (2021), Berghaus and Back (2017), Hrustek et al. (2019) Lammers et al. (2019), Liere-Netheler et al. (2018) Tarutè et al. (2018)		
Industry factors		Tarutè et al. (2018)		
Economic trend		Hrustek et al. (2019)		
Competitive advantage	Lutfi et al. (2022)			

### 2.5.1 Digital Technology Drivers

Digital technologies, structural features and affordances represent the most prominent DT drivers (Alraja et al., 2021; Ismail et al., 2017; Chatterjee et al., 2021; Titko, 2019). These drivers include information intensity, customisability, electronic deliverability, availability, affordability, speed, and agility (Châlons & Dufft, 2017; Hrustek et al., 2019; Ismail et al., 2017; Liere-Netheler et al., 2018; Morakanyane et al., 2017; Osmundsen et al., 2018). These constitute structural features of technology (DeSanctis & Poole, 1994). On the other hand, drivers like the perceived value, efficiency and effectiveness (Al Maamari & Bhuiyan, 2021; Hrustek et al., 2019; Ismail et al., 2017; Liere-Netheler et al., 2018) constitute the spirit features (DeSanctis & Poole, 1994). However, Hrustek et al. (2019) consider the changing technology trends as drivers of DT. Meanwhile, there are calls for periodic reviews of drivers due to the rapidly changing and continuously improving nature of digital technologies (Châlons & Dufft, 2017; Hanelt et al., 2021).

### 2.5.2 Internal System Drivers

Extant literature confirms that it is almost impossible to contend that the growing development of digital technologies alone propels DT, and that DT is driven by complex, multifaceted organisational factors (Parida et al., 2019). Al Maamari & Bhuiyan (2021) classifies DT drivers as organisational while focusing on human resources and culture. Other categorisations are organisation internal systems, and management support (Hrustek et al., 2019; Ismail et al., 2017; Liere-Netheler et al., 2018; Morakanyane et al., 2017; Osmundsen et al., 2018). Meanwhile, Liere-Netheler et al. (2018) have shown that organisations' enormous competencies, coupled with socio-cultural changes and increasing digital competencies of human capital, constitute the leading drivers for DT.

However, Kane et al. (2015) also contended that digital technologies would not be enough to propel the extent of DT witnessed; today without sufficient digital competence, strategies, and talents, which are organisational factors. Moreover, Sanchez-Sepulveda et al. (2019) observed that the advancement of digital technologies had been intrinsically linked with increasing organisational digital capabilities, and supportive socio-cultural changes. Meanwhile, other internal organisational drivers proposed include workplace improvement, process improvement, vertical integration, and horizontal integration (Liere-Netheler et al., 2018; Osmundsen et al., 2018; Parida et al., 2019). Some literature discusses drivers that are outputs and outcomes in nature yet categorises them as internal organisational drivers (Liere-Netheler et al., 2018). These outputs and outcomes may include stakeholder satisfaction, convenience, increased business agility, productivity, profitability, cost reduction and competitive advantage (Liere-Netheler et al., 2018). Other literature shows how stakeholders' support, training, and skills of staff act as determinants of SMEs' usage and adoption of digital technologies (Thuo & Namusonge, 2017).

### **2.5.3 External Environment Drivers**

The environmental drivers include customer innovation push, stakeholder demands, supply chain, market pressure, competitive pressure and regulation or government influence (Haffke et al., 2017; Liere-Netheler et al., 2018; Osmundsen et al., 2018; Parida et al., 2019). Ocloo et al. (2020) emphasise the competitive pressure for SMEs in DCs, particularly in Ghana. In addition, regulatory push and customer trends also drive DT (Hrustek et al., 2019; Sanchez-Sepulveda et al., 2019). Meanwhile, Hrustek et al. (2019) further add competitor and legal trends. On the other hand, Al Maamari & Bhuiyan (2021) classify DT external drivers as regulatory and environmental.

## 2.6 Processes of DT

DT processes are the specific activities needed for DT to occur. According to Mergel et al. (2019), the processes of DT describe how the DT objects of services, products, relationships, technologies, and business models are approached and achieved. This description implies the digitisation and digitalisation of processes, services, products, relationships, and competencies, resulting in different business models (Mergel et al., 2019). DT processes also incorporate several factors that promote the effective adoption of digital technologies and their diffusion into the organisation (Vial, 2019). Like any significant transformational change, DT is not a one-off event but a discrete, linear, and sequential innovation process that follows exact order and differentiated and consecutive phases (Elia et al., 2020; Ivančić et al., 2019). Many scholars have different observations regarding the nature and number of processes organisations undergo in the DT (Berghaus & Back, 2016; Hönigsberg & Dinter, 2019; Vial, 2019).

Meanwhile, Delgado (2017) envisions the processes as an iteration loop, in which each iteration can flow along the following steps: *definitions* (build the framework), *decisions* (build the methodology) and *actions* (build the method). These imply taking steps to (1) Define strategic goals; (2) Identify indicators to assess goal achievement; (3) Derive the set of digital capabilities needed to achieve the intended indicator values; (4) Derive the set initiatives that implement them; (5) Take into account initiative dependencies and resource needs, as well as resources available; (6) Execute initiatives, taking into account policies (that may dictate the order of execution of initiatives) and risks that may prevent intended goals from being achieved; (7) Check whether the intended indicator values have been achieved and Decide whether to iterate or to move forward. Noting that the effect of the availability of a digital capability is not immediate. Hence Delgado's model simply involves *Definition* (vision,

strategy, capabilities and initiatives needed), *Implementation* (execution of initiatives, consideration of risks), and *Assessment* (KPIs measurement and comparison with goals).

On the other hand, Ismail (2017) groups the processes into *adopting*, *evolving*, *envisioning* (which implies changes and relationships), and *relieving* (which factors in the business model scope and strategy). Based on the different processes presented in the extant literature, the DT processes can be classified into five categories: decision and adoption, implementation and digitalisation, organisational changes, adjustments and adaptations, and finally, strategic positioning. These categories and the detailed DT processes are presented with sample papers of extant literature, as shown in Table 2.7.

**Table 2.7 Processes of DT**

Category of Processes Source	Processes	Reference	The highlight of DT in SMEs of DCs Research	Key Gaps
Initiation, decision, adoption	Initiation, Awareness	Dixon et al. (2010), Priyono et al. (2020), Saleh and Manjunath (2020), Ziyadin et al. (2019)	Steps/processes to DT (Zaoui & Souissi, 2020)	Lack of agreement on the initiation and decision-making processes and roadmaps for DT
	Ideation, Decision	Ziyadin et al. (2019)		
	Triggers, Disruptions	Vial (2019)		
	Evaluation, Assessment, and Problem identification	Berghaus and Back (2016), Cuesta et al. (2015), Ziyadin et al. (2019)	Digital paths during COVID (Priyono et al., 2020)	
	Determine funding model	Kane et al. (2017)	Digital paths (Saleh & Manjunath, 2020)	
	Acquisition	Delgado (2017)		
	Objectives, Vision, Opportunities	Cuesta et al. (2015)		
	Commitment	Kane et al. (2017) Ziyadin et al. (2019)		
Implementation (digitisation and digitalisation)	Simulate, Test	Delgado (2017) Kane et al. (2017)	DT paths during COVID (Priyono et al. (2020)	Need for literature on digitalisation and digitisation processes for DT of SMEs in DCs
	Design, Create, Synthesise, and Prioritise	Berghaus & Back (2016) Hönigsberg & Dinter (2019)		
	Strategy, Goal definition, Vision, Strategic responses	Berghaus & Back (2016) Delgado (2017) Hönigsberg & Dinter (2019), Vial (2019)		
	Define digitalisation demand	Hönigsberg & Dinter (2019)		

	Implementation milestone, Digitalisation roadmap	Barann et al. (2019) Vial (2019) Ziyadin et al. (2019)		
	Streamline Process and Procedures	Berghaus & Back (2016) Cuesta et al. (2015)		
	Accelerate transition	Priyono et al. (2020)		
	Identify and integrate a potential supportive environment	Barann et al. (2019) Hönigsberg & Dinter (2019)		
	Digitalise business functions	Priyono et al. (2020)		
Changes to Organisational Processes	Operations, Operational transformation	Barann et al. (2019)	DT paths during COVID (Priyono et al. (2020))	Lack of study on the processes of changes of the DT of SMEs in DCs
	Organisation, Structural, Cultural, and Style changes	Berghaus & Back (2016) Cuesta et al. (2015) Hönigsberg & Dinter (2019) Kane et al. (2017)		
	Changes to the structure, value resources	Vial (2019)		
	Substitute obsolete skills and resources	Berman & Bell (2011) Delgado (2017) Dixon et al. (2010)		
	Reconfigure, Leverage, and Integrate capabilities and resources	Berman & Bell (2011) Dixon et al. (2010) Kane et al. (2017)		
	Product and Services Impact	Berman & Bell (2011) Cuesta et al. (2015)		
Adjustments by organisation	Reacting to new competition	Cuesta et al. (2015)	DT paths during COVID (Priyono et al. (2020))	Lack of agreement on the adjustments and adaptation processes for DT
	Finding digital partners	Priyono et al. (2020)		
	Technological adaptation	Cuesta et al. (2015) Hönigsberg & Dinter (2019)		
	Value proposition, Optimise capabilities	Berman & Bell (2011)		
Strategic positioning	Business model, Digital Business	Berman & Bell (2011)	SMEs in DT (Matt & Rauch (2020))	Lack of literature on DT strategic approaches for SMEs in DCs
	Sustainability, Integration	Berman & Bell (2011) Kane et al. (2017) Ziyadin et al. (2019)		
	Strategic considerations	Barann et al. (2019) Cuesta et al. (2015)		

### 2.6.1 Decision and Adoption Processes

The DT processes are initiated by decision-making and adoption, which may involve awareness creation, ideation processes, problem identification, evaluation, and assessment (Berghaus & Back, 2016; Cuesta et al., 2015; Dixon et al., 2010; Priyono et al., 2020; Saleh & Manjunath, 2020; Ziyadin et al. 2019; Vial, 2019). Meanwhile, other factors like determining to fund,

setting objectives and commitment as part of the initiation, decision-making and adoption processes are further considered (Bui, 2021; Kane et al., 2017; Cuesta et al., 2015; Ziyadin et al., 2019). However, others focus on the DT journey, the need for process identification and the steps required for DT while relating their processes delineation to SMEs in DCs (Bui, 2020; Saleh & Manjunath, 2020; Zaoui & Souissi, 2020).

### **2.6.2 Implementation and Use Processes**

Beyond the adoption, the DT processes involve implementation, digitisation and digitalisation. These processes range from testing and prioritising through roadmap establishment, procedure streamlining and integration (e.g., Barann et al., 2019; Berghaus & Back, 2016; Cuesta et al., 2015; Delgado, 2017; Hönigsberg & Dinter, 2019; Kane et al., 2017; Vial 2019). Different authors mention different emphases and focus. Kane et al. (2017) emphasise simulation and testing as necessary before full implementation, while Berghaus and Back (2016) focus on designing, streamlining, and strategizing.

Meanwhile, Barann et al. (2019) highlight roadmap, integration, and the identification of a supportive environment. Moreover, others emphasise strategy, goal definition, vision, and strategic responses during the implementation. (e.g., Berghaus & Back, 2016; Delgado, 2017; Hönigsberg & Dinter, 2019; Vial 2019). However, Priyono et al. (2020) underscore the importance of the processes, focusing on SMEs in DCs, while considering the entire process as a digital path toward DT, especially in the era of COVID-19. Furthermore, it is essential to accelerate and streamline the implementation processes (Berghaus & Back, 2016; Cuesta et al., 2015; Priyono et al., 2020).

### 2.6.3 Changes to Organisational Processes

Regarding organisational changes, the structural, cultural, style and value resources changes are mentioned (Berghaus & Back, 2016; Hönigsberg & Dinter, 2019; Kane et al., 2017; Vial, 2019). However, the need to substitute obsolete skills and resources, reconfigure, leverage, and integrate capabilities and resources are also vital (Berman & Bell, 2011; Delgado, 2017; Dixon et al., 2010; Kane et al., 2017). Meanwhile, the impact on products and services cannot be ignored (Berman & Bell, 2011; Cuesta et al., 2015). Priyono et al. (2020) also assume organisational changes to be a unique DT process category related to SMEs in DCs.

### 2.6.4 Adjustments by Organisation Processes

Besides the changes to the organisation's internal systems, the organisation also responds by adapting and adjusting to the digitalisation effects. These are seen in the need to react to new competition, find digital partners, adapt to the technologies, propose a value, and optimise capabilities (Berman & Bell, 2011; Cuesta et al., 2015; Hönigsberg & Dinter, 2019; Priyono et al., 2020). The fundamental processes also involve skills and resource alignment to bridge the gap created by the change stage (Hansen et al., 2011). Firms must then adapt to, use, and maintain their implemented digital technologies (Yli-Huumo & Smolander, 2017). The personnel and the entire organisation then adjust and adapt to the DT. SME owners or managers at this stage realise that digital technologies no longer play a supporting function; but become an integral part of the firms' operation and innovation (Ulas, 2019).

### 2.6.5 Strategic Positioning Processes

Regarding strategic positioning, the *business model*, *digital business sustainability*, integration, and strategic considerations are in focus (Barann et al., 2019; Berman & Bell, 2011; Cuesta et al., 2015; Kane et al., 2017; Ziyadin et al., 2019). At the strategic stage, other authors delineate

different maturity process levels of increasing significance, which represent the digitalisation state and level in organisations' DT maturity (e.g., Berghaus & Back, 2016; Berman & Bell, 2011; Delgado, 2017; Dixon et al., 2010; Kane et al., 2017; Paavola et al., 2017; Solis & Szymanski, 2016; Westerman et al., 2011). Most of these further specify activities, elements and dimensions of the maturity levels that fit into the different DT maturity models (Bumann & Peter, 2019; Teichert, 2019). The DT maturity process levels and models are not the focus of this study. Meanwhile, maladjustment at the strategic level could lead to market exit and digitalisation failure (Mahmood et al., 2019). However, successful strategic shifts and positioning lead to new or changes in business models (Mahmood et al., 2019).

## 2.7 Outcomes of DT

The outcomes of DT are the emerging benefits and outputs realised (Morakanyane et al., 2017). Mergel et al. (2019, p. 9) define *DT outcomes* as “the effect that results from an action, or the implementation, of a new measure, thus describing the consequences an implementation may have on services offered, changes in processes as well as the quality of the organisation's relationships with others.” This definition includes outcomes related to improving services, products, processes, and relationships (such as increased simplicity, accessibility, quality, advantages, efficiency, speed, inclusion, responsiveness, competitiveness, security, and transparency) (Mergel et al., 2019).

The outcomes are expressed in extant literature representing the different benefits, measurable or immeasurable, quantitative or qualitative, that could accrue from DT (Verina & Titko, 2019). Extant literature categorises the benefits obtained from DT into interrelated types of benefits, such as value creation, business models and market changes; operational and work processes,

productivity, profitability, and performance; internal organisational changes, external environment, and security (Hanelt et al., 2021; Mahraz et al., 2019; Vial, 2019). The categories with detailed outcomes and sample papers are presented in Table 2.8.

**Table 2.8 Outcomes of DT**

Category of Outcomes Source	Outcomes	Reference	Highlights of DT in SMEs of DCs	Key Gaps
Business model and Market changes	Reformed IS organisation	Haffke et al. (2017) Isaksson & Hylving (2017)	DT benefits for SMEs (Bui (2021))  DT for businesses enabling and reshaping the strategy of SMEs (Rassool & Dissanayake, 2019).  The direct impact of digital orientation, IoT and digital platforms (Yousaf et al., 2021)	Lack of agreement on what constitutes DT outcomes
	New business models	Mahmood et al. (2019) Mahraz et al. (2019) Mocker & Fonstad (2017) Rassool & Dissanayake (2019)		
	Business development	Pousttchi et al. (2019)		
	Value creation	Bui (2021), Galindo-Martín et al. (2019), Mahmood et al. (2019), Reinartz et al. (2019), Reis et al. (2018), Vial (2019) Wang et al. (2018)		
	Competitive advantage	Mahmood et al. (2019), adeem et al. (2018), Vial (2019), Westerman et al. (2011), Rassool & Dissanayake (2019) Yousaf et al. (2021).		
Work Processes and function	Changes in work life and design	Mahraz et al./ 2019) Wang et al. (2018) Schwarz Müller et al. (2018)	DT benefits for SMEs (Bui, 2021)	Need for studies on work processes and functions outputs in DT
	Process alignment	Bui (2021) Pousttchi et al. (2019)		
	Data and information improvements	Pousttchi et al. (2019)		
Productivity, Profitability and Performance	Operational efficiency	Bui (2021), Liere-Netheler et al. (2018), Vial (2019), Wang et al. (2018), Rassool & Dissanayake (2019) Yousaf et al. (2021)	DT benefits for SMEs (Bui, 2021)  The direct impact of digital orientation, IoT and digital platforms (Yousaf et al., 2021)  Impact of DT on the business performance of SMEs (Mubarak et al., 2019).  IT resources for DT among SMEs (Chen et al., 2016).	Lack of literature on the performance outcomes of DT of SMEs in DCs
	Improved organisational performance	Liere-Netheler et al. (2018) Morakanyane et al. (2017) Schwarz Müller et al. (2018) Vial (2019), Chen et al. (2016), Mubarak et al. (2019)		
	Revenue streams	Galindo-Martín et al. (2019) Reddy & Reinartz (2017)		
	Cost savings	Mahmood et al. (2019) Nadeem et al. (2018) Nwankpa & Roumani (2016)		

			DT for businesses enabling and reshaping the strategy of SMEs (Rassool & Dissanayake, 2019).	
Organisation (Internal focus) resource and competence	Changes in structure	Wang et al. (2018); Schwarzmüller et al. (2018)	DT benefits for SMEs (Bui, 2021)	Lack of agreement on what constitutes internal organisation DT outcomes
	Leadership style	Bui (2021) Schwarzmüller et al. (2018)		
	Change in communication and collaborations	Schwarzmüller et al. (2018)		
	Resource and skills	Schwarzmüller et al. (2018)		
	Increased competency requirement	Bui (2021, Pousttchi et al. (2019)		
	Higher job demand	Bui (2021) Schwarzmüller et al. (2018)		
Organisation (External focus) Customers and external Stakeholders	Societal impact and well being	Günther et al. (2017), Vial (2019)	DT benefits for SMEs (Bui, 2021)	Lack of agreement on what constitutes External organisation DT outcomes
	Customer satisfaction and retention	Morakanyane et al. (2017) Galindo-Martín et al. (2019)		
	Customer behaviour	Pousttchi et al. (2019)		
	Customer relations	Mahmood et al. (2019) Pousttchi et al. (2019)		
	Channel Management and marketing	Pousttchi et al. (2019)		
	Stakeholders' satisfaction	Pousttchi et al. (2019)		
	Better networking and collaboration	Pousttchi et al. (2019)		
Security	Security, risk, and privacy issues	Piccinini et al. (2015) Vial (2019) Schwertner (2017) Schwarzmüller et al. (2018)	DT of business (Schwertner, 2017).	Lack of studies on DT security outcomes

### 2.7.1 Business model and Market Changes Outcomes

Value creation and changes in the business model are considered essential outcomes in DT as fundamental changes are always anticipated (Bui, 2021; Galindo-Martín et al., 2019; Mahmood et al., 2019; Reinartz et al., 2019; Reis et al., 2018; Vial, 2019; Wang et al., 2018). Meanwhile, other literature shows that even entirely new business models may be formed out of DT besides the changes leading to digital innovation (Mahmood et al., 2019; Mahraz et al., 2019; Mocker

& Fonstad, 2017; Rassool & Dissanayake, 2019). Furthermore, the created or changed values, and business models help to give the businesses some competitive advantage which is also considered to be outcomes (Mahmood et al., 2019; Nadeem et al., 2018; Vial, 2019; Westerman et al., 2011; Rassool & Dissanayake, 2019; Yousaf et al., 2021). The DT outcomes for SMEs in DC are related to reshaping business strategy and digital platforms (Rassool & Dissanayake, 2019; Yousaf et al., 2021).

### **2.7.2 Work Processes and Function Outcomes**

Regarding the outcomes related to work processes, some literature acknowledges changes in work life and design (Mahraz et al., 2019; Wang et al., 2018; Schwarzmüller et al., 2018), whereas others indicate the alignment of processes in addition to data improvement (Bui, 2021; Pousttchi et al., 2019). Bui (2021) further highlights the work processes benefits of DT for SMEs in DCs.

### **2.7.3 Productivity, Profitability and Performance Outcomes**

DT outcomes cannot be without considering productivity, profitability, and performance increases. The improved effects on organisational performance are copiously acknowledged in literature (e.g., Morakanyane et al., 2017; Schwarzmüller et al., 2018; Chen et al., 2016; Mubarak et al., 2019). At the same time, operational efficiency is recognised (Bui, 2021; Wang et al., 2018; Rassool & Dissanayake, 2019; Yousaf et al., 2021). Meanwhile, high revenues are also highlighted as outcomes in literature (Galindo-Martín et al., 2019; Reddy & Reinartz, 2017) and are often associated with cost savings and reductions (Mahmood et al., 2019; Nadeem et al., 2018; Nwankpa & Roumani, 2016). The profitability and productivity outcomes are significant for SMEs in DCs (Bui, 2019; Chen et al., 2016; Yousif et al., 2021).

#### **2.7.4 Internal Resource and Competence Outcomes**

Organisation-related outcomes are usually considered from internal and external perspectives. The internal outcomes include changes in structure, leadership styles, communications and collaborations, knowledge, and skills (Bui, 2021; Schwarzmüller et al., 2018; Wang et al., 2018). Moreover, there are increased competency requirements and higher job demands (Bui, 2021; Pousttchi et al., 2019; Schwarzmüller et al., 2018).

#### **2.7.5 Customers and Stakeholders' Outcomes**

The external or environmental outcomes relate to customers, external stakeholders, and society at large. It involves improving the business relationship and enhancing customer experience, engagement, loyalty, and relationship (Mahmood et al., 2019). Much emphasis is placed on customer satisfaction and retention, customer relations, and behaviour (Galindo-Martín et al., 2019; Mahmood et al., 2019; Morakanyane et al., 2017; Pousttchi et al., 2019). Furthermore, stakeholder satisfaction, networking, collaboration, societal impact and well-being are seen as DT outcomes (Piccinini et al., 2015; Schwarzmüller et al., 2018; Schwertner, 2017).

#### **2.7.6 Security and Risks Outcomes**

Security-related outcomes express how digitalisation helps to improve and overcome risks and privacy issues (Piccinini et al., 2015; Schwertner, 2017; Schwarzmüller et al., 2018; Vial, 2019). Schwertner (2017) discussed the DT of business and reflected on the lack of studies on DT security outcomes. DT outcomes also bother on issues relating to the security and privacy of organisations' information besides that of personnel, customers and stakeholders (Bedell-Pearce, 2018; Piccinini et al., 2015; Schwarzmüller et al., 2018; Schwertner, 2017; Vial, 2019).

## 2.8 Capabilities and Capacities of SMEs for DT

Despite the new opportunities that DT brings to organisations, it also creates new pressures to develop adequate capabilities and capacities, to conduct such transformations (Dang-Pham, 2020). Many scholars agree that varying capabilities and capacities of organisations influence DT differently, leading to different outcomes (Isaksson & Hylving, 2017, Mocker & Fonstad, 2017). Capabilities refer to features, abilities, faculties, or processes that can be developed or improved, and it denotes the abilities that an individual or organisation can do or achieve (Parker, 2018). In contrast, capacities refer to the features, abilities or resources that exist, which also imply the abilities that an individual or organisation can have or possess (Parker, 2018).

Capabilities and capacities represent the elements of managerial and organisational abilities that can affect the DT of SMEs (Anderson & Adams, 2019; Helfat & Winter, 2011). Extant literature categorises them as managerial capabilities, organisational capabilities, managerial capacities, and organisational capacities (Al Maamari & Bhuiyan, 2021; Fachrunnisa et al., 2020). The categories and the details of the DT capabilities and capacities from extant literature are presented in Table 2.9.

**Table 2.9 SMEs Capabilities and Capacities for DT**

Category of SMEs Capabilities and Capacities	SMEs Capabilities and Capacities	Reference	The Highlight of DT in SMEs of DCs	Key Gaps
Managerial capabilities	Absorptive capability, Creativity, Benchmarking, Leadership agility, Adaptability	Fachrunnisa et al. (2020) Ferreira et al. (2020) Li et al. (2018) Weritz et al. (2020) Wu et al. (2021)	Agility and flexibility to improve SMEs' DT (Fachrunnisa et al., 2020)  The capabilities that enable DT (Wu et al., 2021)	Lack of studies on the influence of managerial capabilities on the DT drivers,

	Relational capability	Weritz et al. (2020) Wu et al. (2021)	The capabilities that enable DT (Wu et al., 2021)	processes, and outcomes
	Continuous learning and development	Hansen et al. (2021) Weritz et al. (2020)		
	Managerial cognition (intellect, understanding and knowledge of current issues, sense of market fluctuations)	Cannas (2021), Helfat et al. (2009), Helfat & Martin (2015), Sousa & Rocha (2019, Tarutè et al. (2018), Wiliandri (2020)	Influencers of DT of MSMEs (Wiliandri, 2020)	
	Managerial decisions, Managerial innovation	Helfat & Martin (2015) Li et al. (2018) Sousa & Rocha (2019) Wu et al. (2021)	The capabilities that enable DT (Wu et al., 2021)	
	Social capital (informal and formal relationships, networks, sharing)	Helfat & Peteraf (2015) Helfat & Martin (2015) Hansen et al. (2021) Li et al. (2018) Wu et al. (2021)	The capabilities that enable DT (Wu et al., 2021)	
	Exploration and Exploitation (capture market opportunities and obtain vital information and resources)	Ferreira et al. (2020) Helfat & Martin (2015)		
Managerial capacities	Human IT resources	Riera & Iijima (2019)		Lack of studies on the influence of managerial capacities on the DT drivers, processes, and outcomes
	Human capital (knowledge, experience, skills, and education)	Al Maamari & Bhuiyan (2021), Cannas (2021) Helfat & Martin (2015)	E-service and DT attributes (Al Maamari & Bhuiyan, 2021)	
	Management skills, Competencies	Ferreira et al. (2020) Ritter & Pedersen (2020)		
	Knowledge, Training	Al Maamari & Bhuiyan (2021)	E-service and DT attributes (Al Maamari & Bhuiyan, 2021)	
Organisational capabilities	Research and development	Rossato & Castellani (2020)		Lack of studies on the influence of organisational capabilities on the DT drivers, processes, and outcomes
	Channel management	Warner & Wager (2019)		
	Strategic change, Business development, Growth	Li et al. (2018)		
	Agility and flexibility	Fachrunnisa et al. (2020) Kane et al. 2017) Weritz et al. (2020)	Agility and flexibility to improve SMEs' DT (Fachrunnisa et al., 2020)	
	Cross-functional collaboration	Kane et al. 2017) Weritz et al. (2020) Zhou et al. (2019)		
	Technological innovation capability	Kane et al. 2017) Weritz et al. (2020) Zhou et al. (2019)		
	Market innovation and orientation	Weritz et al. (2020)		
	Customer centricity	Pihir et al. (2019)		
Team focuses and Team building	Li et al. (2018)			

	Competitive advantage	Ferreira et al. (2020)		
	Strategic change and Orientation	Helfat & Martin (2015) Pihir et al. (2019)		
	Talent, Capability, and capacity strengthening	Pihir et al. (2019) Nadeem et al. (2018)		
	Organisational commitment	Pihir et al. (2019) Singh et al. (2021)	Organisational factors affecting DT (Singh et al., 2021)	
Organisational capacities	IT and Process infrastructure	Ismail et al. (2017) Pihir et al. (2019) Riera & Iijima (2019) Wiliandri (2020) Wu et al. (2021)	Influencers of DT of M SMEs (Wiliandri, 2020)  The capabilities that enable DT (Wu et al., 2021)	Lack of studies on the influence of organisational capacities on the DT drivers, processes, and outcomes
	Resources, infrastructure	Bai et al. (2021) Ferreira et al. (2020) Tarutè et al. (2018) Wiliandri (2020)	Covid-19 Digitalisation of SMEs (Bai et al., 2021I)  Influencers of DT of M SMEs (Wiliandri, 2020)	
	Independent and flexible work structures	Hansen et al. (2021)		
	Incentive structures	Hansen et al. (2021)		
	Firm size	Weritz et al. (2020)		
	Organisation culture	Al Maamari and Bhuiyan (2021) Singh et al. (2021)	E-service and DT attributes (Al Maamari & Bhuiyan, 2021)  Organisational factors affecting DT (Singh et al., 2021)	
	Organisational alignment and organisational structure	Al Maamari and Bhuiyan (2021)	E-service and DT attributes (Al Maamari & Bhuiyan, 2021)	

### 2.8.1 Managerial Capabilities and Capacities

Concerning managerial capabilities and capacities, the Dynamic Managerial Capabilities (DMC) concept (Adner & Helfat, 2003; Ambrosini & Altintas, 2019; Helfat & Martin, 2015) offers an enormous understanding of how managerial capabilities and capacities can influence SMEs' DT. Helfat and Martin (2015) outline three (3) core concepts underpinning the DMC concept: managerial cognition, managerial social capital, and managerial human capital.

Meanwhile, cognition and social capital are related to capabilities, whereas human capital is related to capacity.

The *Managerial cognition concept* is defined as “managers' personal beliefs, values, and rational principles for decision-making” (Adner & Helfat, 2003, p1021). The cognitive processes include thinking, knowing, remembering, judging, and problem-solving. Therefore, managers' intellect, understanding and knowledge of current issues and challenges, and managing them are considered critical aspects of managerial cognition (Kumbure et al., 2020). Managerial cognition influences managers' sense of market fluctuations and their subsequent adjustment to these changes. Viglia et al. (2018) also emphasise the pivotal role of cognition in encouraging the active involvement of stakeholders and managers in digital platforms and, for that matter, DTs.

The *managerial social capital concept* consists of managers' informal and formal relationships with others connected with their businesses (Helfat & Martin, 2015). Social capital is a concept that emphasises the importance of social contact and connection between groups and within groups. Social capital involves bonding, bridging, and linking within social networks. Managerial social capital helps managers acquire reliable organisational opportunities and overcome threats (Huy & Zott, 2019). By depending on managerial social capital networks, managers can capture market opportunities and obtain vital information and resources required to pursue DT in SMEs.

The *managerial human capital concept* implies human managerial capacity and comprises the knowledge, experience, skills, and education possessed by individual managers and teams of managers (Martin & Bachrach, 2018). Human capital is an intangible asset or quality relating

to an organisation's personnel. It can be classified as the worker's experience and skills (Martin & Bachrach, 2018). Human capital includes assets like education, training, intelligence, skills, health, and other things employers value, such as loyalty and punctuality. Different managers may have differing training, skills, and experience; therefore, their knowledge and skillset for getting information, identifying opportunities, and realigning resources may also vary (Bleady et al., 2018; Helfat & Martin, 2015). Adapting to DT is thus substantially dependent on the managerial human capital of the SME.

Key IS articles that use the DMC concept in DT research focus on business-to-business, selling in transition and the e-business firm internationalisation processes (Yan et al., 2020). The relationship between the managerial cognitive capabilities has been researched by de Souza & Forte (2021) and used to develop frameworks for the individual evaluation of DT (Li et al., 2017). The primary constructs of managerial cognition, managerial social capital, and managerial human capital were used in these evaluations. Hence, applying this DMC concept in evaluating the SMEs capability and capacity influence on DT drivers, processes, and outcomes in DCs, is appropriate.

Besides the DMC, some extant literature expresses managerial capabilities in terms of absorptive capability, creativity, benchmarking, leadership agility, and adaptability (Fachrunnisa et al., 2020; Ferreira et al., 2020; Li et al., 2018; Weritz et al., 2020; Wu et al., 2021). Others articulate it in terms of intellect, understanding and knowledge of current issues, and a sense of market fluctuations (Cannas, 2021; Sousa & Rocha, 2019; Taruté et al., 2018; Wiliandri, 2020). Still, some convey it as relational capability, continuous learning and development, exploration, and exploitation (Ferreira et al., 2020; Hansen et al., 2021; Weritz et al., 2020; Wu et al., 2021). Others are about managerial decisions and innovations (Helfat &

Martin, 2015; Li et al., 2018; Sousa & Rocha, 2019; Wu et al., 2021). Further, others see it as formal and informal relationships, networks and sharing (Hansen et al., 2021; Li et al., 2018; Wu et al., 2021).

Managerial capacities, on the other hand, are presented in other extant literature as human IT resources, management skills, competencies, knowledge, experience, education, and training (Al Maamari & Bhuiyan, 2021; Cannas, 2021; Ferreira et al., 2020; Riera & Iijima, 2019; Ritter & Pedersen, 2020). The managerial capability can strongly influence the processes and outcomes of DT, thereby requiring research direction (Ritter & Pedersen, 2020). Meanwhile, Al Maamari & Bhuiyan (2021) focus on SMEs in DC while underscoring knowledge, skills, experience, and education. All these variations could still be expressed through the DMC.

### 2.8.2 Organisational Capabilities and Capacities

Helfat and Winter (2011) also introduced two dimensions of organisations' abilities, namely: capabilities and capacities. Meanwhile, *organisational capability* implies firms' or organisations' ability to perform activities dependably. On the other hand, *organisational capacity* reflects the firm's organisational resources and existing facilities required for operational objectives. However, an organisation's capability has also been described as conducting an activity or task in a necessary procedure, whereas capacity represents the resource needed to make or provide a product mix (Anderson & Adams, 2019). Organisational capabilities and capacities are two distinct concepts (Anderson & Adams, 2019).

That notwithstanding, organisational capability can be regarded as “a firm's ability to perform repeatedly a productive task which relates either directly or indirectly to a firm's capacity for creating value through effecting the transformation of inputs into outputs” (Grant, 1996, p.

377). Therefore, there could be a relationship between organisational capabilities and capacities, where capacity positively influences an organisation's capability (Anderson & Adams, 2019). Organisations or firms vary in capabilities and capacity in various industries or sectors. Hence for a firm to succeed in any sector or industry, the firm must have the requisite organisational capability and capacity in that sector or industry.

In terms of organisational capability, extant literature mentions research & development, channel management, strategic change, business development, growth, agility and flexibility, and cross-functional collaboration (e.g., Fachrunnisa et al., 2020; Kane et al., 2017; Li et al., 2018; Rossato & Castellani, 2020; Warner & Wager, 2019; Weritz et al., 2020; Zhou et al., 2019). Other literature, however, articulates the organisational capability as technological innovation capability, market innovation and orientation, customer centricity, team focus and team building (e.g., Kane et al., 2017; Li et al., 2018; Pihir et al., 2019; Weritz et al., 2020; Zhou et al., 2019).

Further, some other literature expresses organisational capabilities as a competitive advantage, strategic change and orientation, talent, capability and capacity strengthening, and organisational commitment (e.g., Ferreira et al., 2020; Helfat & Martin, 2015; Pihir et al., 2019; Singh et al., 2021). Meanwhile, Nadeem et al. confirm the significant role of organisational capabilities on DT and yet admits its lack in literature. Fachrunnisa et al. (2020) and Singh et al. (2021) focus on SMEs' organisational capabilities for DT in DCs, highlighting commitment and agility.

Concerning the organisational capacity as a category, the extant literature describes the detailed capacities as IT and process infrastructure, resources, other infrastructure, independent and

flexible work structures, and incentive structures (e.g., Bai et al., 2021; Ferreira et al., 2020; Hansen et al., 2021; Ismail I et al., 2017; Pihir et al., 2019; Riera & Iijima, 2019; Singh et al., 2021; Tarutè et al., 2018; Wiliandri, 2020; Wu et al., 2021). Other literature further illustrates the organisational capacities in terms of firm size, organisation culture, organisational alignment, and organisational structure (Al Maamari & Bhuiyan, 2021; Singh et al., 2021; Weritz et al., 2020). Meanwhile, some research focuses on SMEs' organisational capacities for DT in DCs, highlighting infrastructure, culture, and alignment (Al Maamari & Bhuiyan, 2021; Singh et al., 2021; Wiliandri, 2020; Wu et al., 2021).

## **2.9 DT of SMEs in DCs**

Notwithstanding the broad positive outcomes of DT, not all organisations observe the same DT outcomes. DCs, with their sociodemographic trait, level of digital maturity, and unique political, institutional, and developmental contexts, make the SMEs in DCs more susceptible to capabilities and capacities influence (Katz, 2019). Furthermore, the lack of solid institutional structures and infrastructure may differ significantly in DT experience and outcomes, especially among SMEs in DCs (Al Busaidi et al., 2019; Myovella et al., 2020).

Thus, the current literature gap that needs research attention is how the different developmental contexts of digital technology access, sociodemographic differences, and trust in DT result in unique experiences regarding the DT drivers, processes, outcomes, capabilities, and capacities (Alraja et al., 2021; Barnard et al., 2017; Chandra et al., 2020; Goerzig & Bauernhans, 2018). The summary of the extant literature involving the DT of SMEs in DCs and relating to the DT drivers, processes, outcomes and SMEs capabilities and capacities are presented in Table 2.10

**Table 2.10 DT of SMEs in DCs**

DT factor	Category of DT factor	Reference	Highlight	Key Gaps
Digital Technologies	Mobile computing	Al Maamari and Bhuiyan (2021)	DT factors for efficiency, focusing on mobile computing	Lack of studies on trends and types of digital technologies in DT  Rapid changes in technologies call for periodic review
		Ezeokoli et al. (2019)	Technology trend readiness – Mobile	
	Cloud computing	Ezeokoli et al. (2019)	Technology trend readiness – Cloud	
	Platforms	Li et al. (2017)	DT of SMEs via a digital platform service provider	
	Artificial intelligence (AI)	Yousaf et al. (2021)	IoT and digital platforms for SMEs' DT	
		Chatterjee et al. (2021)	Role of AI for DT of SMEs in India	
	Analytics	Ogbuokiri et al. (2015)	Big data analytics for SMEs	
		Ezeokoli et al. (2019)	Technology trend readiness – Big data	
DT Drivers	Technology	Al Maamari and Bhuiyan (2021)	DT drivers for efficiency	Lack of literature on DT drivers  Lack of agreement on what constitutes DT drivers  Rapid changes in technologies and organisations call for periodic reviews
		Lutfi et al. (2022)	Drivers of big data analytics in DT	
		Alraja et al. (2021)	Drivers of the digitalisation process of SMEs	
		Chatterjee et al. (2021)	Factors influencing DT and the entrepreneurship process	
		Schwertner (2017)	Security in DT of Business	
	Organisation (external)	Al Maamari and Bhuiyan (2021)	DT factors for efficiency, focus on external drivers	
		Lutfi et al. (2022)	Drivers of big data analytics in DT	
		Alraja et al. (2021)	Drivers of the digitalisation process of SMEs	
	Organisation (internal)	Al Maamari and Bhuiyan (2021)	DT drivers for efficiency	
		Lutfi et al. (2022)	Drivers of big data analytics in DT	
Alraja et al. (2021)		Drivers of the digitalisation process of SMEs		
DT Processes	Initiation, decision, adoption	Priyono et al. (2020)	Digital paths during COVID	Lack of studies and agreement on what constitutes DT processes
		Saleh and Manjunath (2020)	Digital paths	
		Zaoui and Souissi (2020)	Steps/process to DT of companies	
	Implementation (digitisation/digitalisation)	Priyono et al. (2020)	Digital paths during COVID	
	Organisational changes	Priyono et al. (2020)	Digital paths during COVID	
	Strategic positioning	Matt & Rauch (2020)	Strategizing as a DT process in SMEs	

DT Outcomes	Business model / Market changes	Bui (2021)	DT benefits for SMEs	Lack of studies and agreement on what constitutes DT Outcomes
		Rassool and Dissanayake (2019)	DT for businesses enabling and reshaping the strategy of SMEs	
		Yousaf et al. (2021)	The direct impact of digital orientation, IoT and digital platforms	
	Productivity, profitability, and performance	Mubarak et al. (2019)	Impact of DT on business performance of SMEs	
		Chen et al. (2016)	IT resources for DT among SMEs	
		Yousaf et al. (2021)	The direct impact of digital orientation, IoT and digital platforms	
Security	Schwertner (2017)	DT of business		
Capabilities and Capacities	Managerial capabilities	Fachrunnisa et al. (2020)	Agility and flexibility to improve SME's DT	Lack of studies on the influence of capabilities and capacities on DT drivers, processes, and outcomes
		Wu et al. (2021)	The capabilities that enable DT	
		Wiliandri (2020)	Influencers of DT of MSMEs	
	Organisational capabilities	Fachrunnisa et al. (2020)	Agility and flexibility to improve SME's DT	
		Singh et al. (2021)	Organisational factors affecting DT	
	Managerial capacities	Al Maamari and Bhuiyan (2021)	E-service and DT attributes	
	Organisational capacities	Singh et al. (2021)	Organisational factors affecting DT	
		Wiliandri (2020)	Influencers of DT of MSMEs	
		Wu et al. (2021)	The capabilities that enable DT	
		Bui et al. (2021)	Covid-19 Digitalisation of SMEs	
Al Maamari and Bhuiyan (2021)		E-service and DT attributes		

### 2.9.1 Digital Technologies in DT of SMEs in DCs

The extant literature relating to digital technologies for the DT of SMEs in DCs refers to mobile computing, cloud computing, platforms, AI, and analytics. Ezeokoli et al. (2019) discuss technology trends for DT, emphasising mobile, cloud, and analytics. Meanwhile, these papers highlight digital technologies as factors for SMEs' efficiency, productivity, and growth (Agwu,

2018; Bhuiyan, 2021; Ogbuokiri et al., 2015). Other papers relate to platforms service, IoT and AI for DT in SMEs (Chatterjee et al., 2021; Yousaf et al., 2021).

### **2.9.2 Drivers in DT of SMEs in DCs**

Regarding the DT drivers for DT of SMEs in DCs, more papers focus on technology-related drivers than other organisational drivers. The technology-related articles discussed efficiency, big data, entrepreneurship, digitalisation, and security as the key issues (Al Maamari Bhuiyan, 2021; Alraja et al., 2021; Chatterjee et al., 2021; Lutfi et al., 2022; Schwertner, 2017). A few papers related to external organisation drivers focus on efficiency, analytics, and digitalisation (Al Maamari & Bhuiyan, 2021; Alraja et al., 2021; Lutfi et al., 2022). Interestingly the same papers discuss the internal organisational drivers. Only Mahmood et al. (2019) discuss issues about challenges and the impact of drivers.

### **2.9.3 Processes in DT of SMEs in DCs**

The DT processes with papers relating to DT of SMEs in DCs tackle digitalisation initiation, implementation, organisational changes, and strategic positioning (Matt & Rauch, 2020; Priyono et al., 2020; Saleh & Manjunath, 2020; Zaoui & Souissi, 2020). The key issues discussed are the paths to DT (Priyono et al., 2020; Saleh & Manjunath, 2020; Zaoui & Souissi, 2020). Priyono et al. (2020) emphasise how COVID-19 influences DT paths by confirming the influence of DT drivers on DT processes. On the other hand, Matt & Rauch (2020) emphasises strategic positioning as a process the SMEs follow in their DT.

### **2.9.4 Outcomes in DT of SMEs in DCs**

For the DT outcomes, the literature refers to profitability, productivity, performance, security, business models and market changes (Bui, 2021; Chen et al., 2016; Mubarak et al., 2019;

Rassool & Dissanayake, 2019; Schwertner, 2017; Yousaf et al., 2021). In discussing these outcomes, the issues of much concern include benefits for SMEs and the impact of digital orientation on performance (Bui, 2021; Mubarak et al., 2019; Yousaf et al., 2021). However, Rassool & Dissanayake (2019) focus on how the DT enable and reshapes strategy as outcomes for SMEs. On the other hand, Schwertner (2017) shows DT's influence on businesses.

### **2.9.5 Capabilities and Capacities in DT of SMEs in DCs**

Regarding the capabilities, the literature related to DT of SMEs in DCs focuses on managerial and organisational aspects. Wiliandri (2020) and Wu et al. (2021) focus on managerial capabilities while highlighting general influencers and capabilities to enable and improve SMEs' DT. On the other hand, Singh et al. (2021) focus on organisational capabilities and how they affect DT. Meanwhile, Fachrunnisa et al. (2020) concentrate on managerial and organisational capabilities, emphasising agility and flexibility to improve the DT of SMEs in DCs. Al Maamari & Bhuiyan (2021).

Regarding capacities, Al Maamari & Bhuiyan (2021) focuses on managerial and organisational capacity, emphasising e-services and the DT attributes. Meanwhile, Bui et al. (2021), Singh et al. (2021), Wiliandri (2020), and Wu et al. (2021) dwell on the organisational capacities while concentrating on the issues of how the factors of organisational capacities influence and determine the processes and outcomes of the DT. Bui et al. (2021) relate the capacity effect with the drive resulting from the COVID-19 pandemic.

## 2.10 Research Gaps of Interest to this Doctoral Study

The research gaps of interest in this study, the corresponding categories of DT factors, their definitions, along with the factors and respective references are summarised in Table 2.12

**Table 2.11 Summary of Research Gaps of Interest to this Thesis**

RQ No	Gap Addressed	Key Factors (Definition)	Dimensions	Key Literature Examples
1	<p>The lack of agreement on what constitutes DT drivers, processes, and outcomes (Liere-Netheler et al., 2018)</p> <p>The call for a review of DT drivers and outcomes (Indriastuti &amp; Fuad, 2020; Kumar &amp; Ayedee, 2021; Priyono et al., 2020)</p> <p>The need for periodic reviews is due to rapid changes in digital technologies and the dynamic nature of DT, resulting in changing drivers, processes, and outcomes over time (Châlons &amp; Dufft, 2017).</p> <p>The lack of studies on DT drivers, processes, and outcomes, and recommendations for further studies (Mahmood et al., 2019).</p>	<p><b>DT Drivers</b></p> <p><i>Attributes that influence and enable the processes of DT (Morakanyane et al., 2017).</i></p>	Technology	Al Maamari and Bhuiyan (2021)
			External organisation	Lutfi et al. (2022)
			Internal organisation	Alraja et al. (2021)
		<p><b>DT Processes</b></p> <p><i>How the DT objects of processes, services, products, relationships, technology, and business model are approached and achieved (Mergel et al., 2019).</i></p>	Decision and adoption	Zaoui and Souissi et al. (2020)
			Implementation	Priyono et al. (2020)
			Changes to Organisations	Delgado (2017)
			Adjustments by organisations	Hönigsberg and Dinter (2019)
			Strategic positioning	Matt and Rauch (2020)
			Business model and market changes	Yousaf et al. (2021)
		<p><b>DT Outcomes</b></p> <p><i>The emerging benefits realised from DT (Morakanyane et al., 2017).</i></p>	Work, process, and function outcomes	Bui (2021)
			Productivity, profitability and performance	Mubarak et al. (2019)
			Internal system resources and competence	Schwarz Müller et al. (2018)
			External environment, customers, and stakeholders	Pousttchi et al. (2019)
Security and Risks	Vial (2019)			
2	<p>Lack of studies examining the interrelationships among DT drivers, DT processes, and DT outcomes (Liere-Netheler et al., 2018; Hrustek et al., 2019; Reis et al., 2018).</p> <p>The need to determine the influence of drivers of DT outcomes is necessary, yet literature lacks it (Osmundsen et al., 2018; Parida et al., 2019).</p> <p>Mere identification of factors is not enough to understand DT, but their</p>	<p><b>Drivers Influences</b></p>	Drivers Influence Processes	
			Drivers Influence Outcomes	Hrustek et al. (2019)
		<p><b>Processes Influences</b></p>	Processes Influence Drivers	
			Processes Influence Outcomes	

	influences are key ((Hrustek et al., 2019; Liere-Netheler et al., 2018)  DT drivers are classified as customer-driven, technology-driven, and organisational-driven and can influence DT outcomes and create business models differently. (Hrustek et al., 2019; Muditomo & Wahyudi, 2021)	<b>Outcomes Influences</b>	Outcomes Influence Drivers	
			Outcomes Influence Processes	
3	The need to consider the DT approaches and effects in different situational contexts. (Berghaus and Back, 2017)  Current studies on DT in SMEs are silent on how the capabilities and capacities of firms influence DT drivers, processes, and outcomes (Muditomo & Wahyudi, 2021; Taruté et al., 2018)  Understanding the influence of SMEs capabilities and capacities on DT serves as a strategic assessment of how to approach DT and achieve the expected outcomes (Nambisan et al., 2019; Zhang et al., 2022).  The need for further research in tackling other aspects of DT, like organisational structure, capacities, capabilities, and their d its influence on DT (Issa et al., 2018; Li et al., 2018; Vial, 2019).	<b>Capabilities</b>  <i>Capabilities refer to features, abilities, faculties, or processes that can be developed or improved (Parker, 2018).</i>	Managerial capabilities	Fachrunnisa et al. (2020)
			Organisational capabilities	Weritz et al. (2020)
			Capabilities Influence	
		<b>Capacities</b>  <i>Capacities refer to the features, abilities or resources that exist (Parker, 2018).</i>	Managerial capacities	Cannas (2021)
			Organisational capacities	Wiliandri (2020)
			Capacities Influence	

## 2.11 Chapter Summary

Extant literature on diverse research perspective in DT were reviewed, and the review methodology was spelt out. The key concepts and terms in DT, including digitisation, digitalisation, digital innovation, and DT, were explained. The extant literature was reviewed concerning digital technologies, DT drivers, processes, and outcomes. Other reviews involved the capabilities and capacities of SMEs and DT of SMEs in DCs. A summary of the research gaps of interest to the study was provided.

## CHAPTER THREE


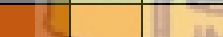
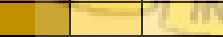


### 3 THEORETICAL FOUNDATIONS AND RESEARCH FRAMEWORK

#### 3.1 Chapter Overview

This chapter presents the theoretical underpinning of the study in four main sections. The first section defines and explains theories, models, and theoretical and conceptual frameworks. The second section discusses theories, models, and frameworks for IS and DT research. The third section presents the theoretical framework of the study, based on the Adaptive Structuration Theory (AST) and discusses the theory. The fourth section presents the study's conceptual framework, which combines the theoretical framework with other concepts and literature to conceptualise the fundamental research logically. This section provides separate conceptualisations for DT drivers, processes, outcomes, SMEs capabilities and capacities. These separate conceptualisations culminate in an integrated pre-study conceptual framework that reflects the DT factors and their relationships.

The legend of colour codes used in the figures of this chapter to represent the different factors and typologies is shown in Table 3.1

**Table 3.1 Legend of Colour Codes in Figures of Chapter 3**

Colour	Shades of Colours	Typologies Represented
<i>Greyish</i>		Digital Technologies
<i>Reddish</i>		Drivers of DT
<i>Yellowish</i>		Processes of DT
<i>Greenish</i>		Outcomes of DT
<i>Blueish</i>		Capabilities and Capacities of SMEs

## 3.2 Theory, Model, Theoretical and Conceptual Frameworks

This section defines and explains theories, models, theoretical frameworks, and conceptual frameworks as they apply to IS research.

### 3.2.1 Theories and Models in Research

A *theory* is defined as “a set of interrelated constructs (concepts), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables to explain and predict the phenomena” (Kerlinger & Lee, 2000, p. 11). A theory is further explained to have three aspects: (1) a theory is a set of propositions consisting of defined and interrelated constructs; (2) a theory sets out the interrelations among a set of variables (constructs), thereby presenting a systematic view of the phenomena described by the variables; (3) a theory explains phenomena by specifying which variables are related to other variables and how they are related, thus enabling the researcher to predict variables. (Kerlinger & Lee, 2000, p. 11). Also, “a theory describes a specific realm of knowledge and explains how it works” (Swanson, 2013, p. 4).

A *model* is “a systematic description of a system, a theory or a phenomenon that accounts for its known or inferred properties which may be used to further study its characteristics” (Samaradiwakara & Gunawardena, 2014, p 23). Also, “a model is an abstract representation of some portion of the real world, constructed for understanding, explaining, predicting or controlling a phenomenon being investigated” (Burch 2003, p 266). A model may be schematically or graphically presented to illustrate the system, theory or phenomenon it seeks to explain.

### 3.2.2 Theoretical and Conceptual Frameworks in Research

A *theoretical framework* is “a structure that summarises concepts and theories, which are developed from previously tested and published knowledge (theories, models)” (Kivunja, 2018, p. 46). “The concepts and theories are synthesised to help provide a theoretical background, or basis for data analysis and interpretation of the meaning contained in research data” (Kivunja, 2018, p. 46). A theoretical framework is a structure that can hold or support a theory of a research study (USC Libraries, 2022).

Theoretical frameworks in IS research are essential, offering guidance for the study. The theoretical framework introduces and describes the theories and concepts that explain why the research problem underlying the study exists (Kivunja, 2018). The theoretical framework specifies which key variables influence a phenomenon of interest and highlights the need to examine how those key variables might differ and under what circumstances. The researcher's theoretical framework connects to existing knowledge (Kivunja, 2018). It can also be looked at as a structure or a data mining lens that uses knowledge from previous research, theories, and models in a particular field, to make sense of the data in a current research study.

A *conceptual framework* is “the total, logical orientation and associations of anything and everything that forms the underlying thinking, structures, plans, practices and implementation of the entire research project” (Kivunja, 2018, p. 47). So, the conceptual framework comprises the thoughts on identifying the research topic, the problem to be investigated, the questions to be asked, the literature to be reviewed, and the theories to be applied. It also involves the methodology, the methods, procedures and instruments, the data analysis and interpretation of findings, recommendations, and conclusions to be made (Ravitch & Riggan, 2017). According

to Jabareen (2009), conceptual frameworks consist of related concepts that comprehensively explain the studied phenomenon.

Conceptual frameworks are developed to help the researcher find out about the nature of reality (ontology), the knowledge and understanding of reality (epistemology) and the steps to study the nature and understanding of reality (methodology) (Gustomo et al., 2017). In qualitative research, conceptual frameworks are derived from discipline-based theories and literature that become data for analysis and, in some cases, offer a better understanding than theoretical explanations (Guntur, 2019). The focus of the conceptual framework for qualitative research is to analyse many different discipline-based theories to generate new explanations, interpretations, and understanding of a particular phenomenon (Guntur, 2019).

Therefore, “a conceptual framework provides the orientation to the study and assists both the researcher and reader in seeing how the study contributes to the body of knowledge on the topic, how the elements align, and how the study design and methodology meet rigorous research standards” (Crawford, 2020, p 36). A conceptual framework may be developed from the theoretical framework in research studies (Crawford, 2020).

### **3.3 Theories, Models and Frameworks for IS and DT Research**

Many theories, models and frameworks have been designed to explore the acceptance and use of technologies in IS research (Samaradiwakara & Gunawardena, 2014). These theories, models and frameworks have also been employed in DT studies (Nwaiwu, 2018). Theories and models guide the development of theoretical and conceptual frameworks for research (Kivunja, 2018; Zincir, 2020). Therefore, reviewing existing theories, models, and frameworks for DT

research in the extant literature is considered relevant to this study. This review is presented in this section. The presentation covers the main theories and models in IS for DT research and other specific DT frameworks.

### 3.3.1 Main Theories, Models and Frameworks in IS for DT Research

Some significant theories, models and frameworks for IS research are very popular with researchers (Kivunja, 2018; Nwaiwu, 2018; Samaradiwakara & Gunawardena, 2014). These theories, models and frameworks also suit and are used for DT research, especially relating to the adoption and use of digital technologies (Kivunja, 2018; Nwaiwu, 2018).

The different theories, models and frameworks in IS, applied to DT research, have different perspectives and approaches. Some focus on the technology's characteristics to determine its adoption, while others focus on the behavioural attributes of the individual decision-makers. Still, others rely on internal organisational features, while some depend on the external environment. However, most of these theories, models and frameworks consider variables or constructs from combinations of technology, behavioural, internal, or external environmental characteristics. The reviewed theories, models and frameworks in IS for DT research are presented in Table 3.2.

**Table 3.2 Main Theories Models and Frameworks in IS for DT Research**

Categories of Theories, Models and Frameworks	DT Theory, Model, or Framework	DT Papers using the Theory, Model or Framework	Highlight of issue	DT factors studied
Technology-based adoption models	Affordance theory (Norman, 1999)	Du et al. (2019)	Affordances in blockchain DT	DT Drivers
	Theory of Diffusion of Innovations (DOI) (Rogers, 1995, 2003)	Lutfi et al. (2022)	Influencing factors for big data adoption in DT of SMEs	

Behavioural-based adoption models	Theory of Reasonable Action (TRA) (Fishbein & Ajzen, 1975)	Ha & Khoa (2021)	Businesses' self-efficacy toward Google advertising services	DT Drivers
	Theory of Planned Behaviour (TPB) (Ajzen, 1985, 1991)	Grandón & Ramírez-Correa (2018)	Drivers and obstacles as antecedents of attitude toward e-commerce acceptance.	
	Decomposed Theory of Planned Behaviour (DTPB) (Taylor & Todd, 1995)	Giovanis et al. (2021)	Adoption of proximity mobile payment services in DT	
Behavioural and Technology-based adoption models	Technology Acceptance Model (TAM) (Davis, 1989)  (TAM2) (Venkatesh & Davis, 2000)  (TAM3) (Venkatesh & Bala, 2008)	Güngör et al. (2020)	Psychological antecedents of DT	DT Drivers
		Chatterjee et al. (2021)	Determinants that impact digital entrepreneurship for the SMEs	
		Nurqamarani et al. (2021)	Technology adoption in SMEs	
		Franco et al. (2021)	Influence of digital entrepreneurship on the digitalisation and management of SMEs	
Behavioural and Technology-based Adoption and Outcomes Models	Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh et al., 2003)  Extended Unified Theory of Acceptance and Use of Technology (UTAUT2), (Venkatesh et al., 2012)	Hewavitharana et al. (2021)	Behaviours that affect DT	DT Drivers
		Umeh et al. (2020)	Enablers and barriers of digital business adoption for SMEs in DCs	
		Ab Wahid & Aziidah Zulkifli (2021)	Factors affecting the adoption of DT in SMEs	DT Outcomes
		Yawised et al. (2022)	Factors affecting the intention of mobile application adoption in SMEs	consumer expectations
Technology, Tasks, Use, and Impact	Theory of Task-technology fit (TTF) (Goodhue & Thompson, 1995)	Yoo & Kim (2019)	Cloud computing adoption	DT Drivers
		Agnihotri (2021)	Salesforce automation to DT, how social technologies influence DT	
	DeLone and McLean IS Success Model (DeLone & McLean, 1992, 2003, 2016).	Fitz & Scheeg (2021)	Impact of moral values in IS design on IS success	DT Outcomes
		Salgado et al. (2020)	Drivers of Mobile Health Acceptance and Use	
Organisational capabilities, resources, and performance Based Models	Resource-Based View (Wernerfelt, 1984). (Barney, 1991)	Eller et al. (2020)	How resources influence the antecedents, consequences, and challenges of SME digitalization	SMEs capabilities and Capacities
		Chen et al. (2016)	Effect of the implementation of a web portal as an IT resource on SMEs' organisational performance	
	Dynamic Capability Theory (DCT) (Teece et al., 1997)	Fachrunnisa et al. (2020)	Agile leadership and strategic flexibility to improve DT in SMEs	

		Zhang et al. (2022)	Growth mechanism and evolution path of dynamic capability affecting enterprise DT	
	Dynamic Managerial Capabilities (DMC) (Adner & Helfat, 2003)	Matarazzo et al. (2020)	Capabilities perspectives of DT	
		Li et al. (2018)	Dynamic managerial capabilities of SMEs	
Technology, Organisation, Environment based Adoption Models	Technology, Organisation, Environment Model (TOE) (Tornatzky & Fleischer, 1990)	Bai et al. (2021)	Covid-19 Digitalisation of SMEs	DT Drivers
		Van Dyk & Van Belle (2019)	Factors influencing DT adoption	
		Lutfi et al. (2022)	Influencing factors for big data adoption in DT of SMEs	
		Alraja et al. (2021)	Factors influencing the transformation into digitalisation by SMEs	
		Wang & Su (2021)	Driving factors of DT	
Technology, Organisation, Environment, Tasks, Outcomes, and their Interactions	Adaptive Structuration Theory (AST) (DeSanctis & Poole, 1994)	Pesonen (2020)	How technology affects leadership and management in DT of tourism SMEs	DT Drivers, DT Processes, DT Outcomes
		Ko et al. (2021)	Understanding of the appropriation of ICT-based Smart-work and its impact on performance in organisations	
		Shao & Li (2022)	Influences of task characteristics on innovative use of digital technologies,	
		Thapa et al. (2022)	Relationship between transformational leadership and employee performance in	
		Veeraya et al. (2021)	Digital Leadership and Organisational Change for DT	
		Tan & Sedera (2007)	Conceptualising ERP systems implementation with AST	

### 3.3.2 Other Specific DT Frameworks

Other frameworks have been developed specifically for studying DT by some researchers. However, most are not scientifically validated and are less popular, yet they are worth considering as there is no classical framework in the DT field (Kivunja, 2018; Nwaiwu, 2018). Moreover, these frameworks are newly proposed and have not been cited much in extant literature. Meanwhile, these frameworks also lack precise guidelines for their use.

Based on the viewpoints of these frameworks, they have been clustered into three (1) holistic organisational viewpoints, (2) operational and processual viewpoints, and (3) innovation and reinvention viewpoints. These DT frameworks should be distinguished from DT maturity models, which assess the maturity levels of firms that have already digitally transformed, matured and moved into strategic dimensions (Bumann & Peter, 2019; Teichert, 2019). The focus of this DT framework review precludes DT maturity models. The reviewed specific DT frameworks are presented in Table 3.3.

**Table 3.3 Other Specific DT Frameworks**

Viewpoint of Framework	DT Framework	Other References	Highlight of Framework	Elements of Framework
Holistic Organisational Viewpoint	DT Framework (Matt et al. 2015)	Modiba et al. (2018), Nwaiwu (2018) Subramanian et al. (2021)	Tackles specific corporate DT dynamics, based on the concept that DT conduces as a cornerstone in organisation	(1) Use of technologies, (2) Changes in value creation, (3) Structural changes, (4) Financial aspects
	Digital Enterprise Integrative Management Framework (Bowersox et al. 2015)	Nwaiwu (2018) Subramanian et al. (2021)	Based on a supply chain excellence viewpoint, proper supply chain excellence will only come from making a digital business transformation	(1) Enterprise core processes, (2) Real-time connectivity, (3) Operational excellence (4) Responsiveness
	DT Framework (Westerman et al. 2011)	Nwaiwu (2018)	Describes and visualises the comprehension of organisational initiatives toward DT	<u>Internal layers:</u> (1) Transformative digital vision, (2) Digital governance, (3) Iterative transformation roadmap, (4) Digital engagement  <u>Internal layers:</u> (1) Strategic assets, (2) Digital building blocks, (3) Digital investments
	Cognizant's Digital Business Transformation Framework (Corver & Elkhuizen 2014)	Nwaiwu (2018) Subramanian et al. (2021)	Customers build the cornerstone of DT digital vision based on new commercial models grounded on digital opportunities.	(1) Customer, (2) Product, (3) Processes and systems, (4) Organisation

Operational and Processual Viewpoint	Digitisation Piano – Digital Business Transformation (Wade, 2015)	Modiba et al. (2018) Nwaiwu (2018) Subramanian et al. (2021)	Describes that successful DT is linked with organisational change and enhanced performance based on a conjunction that combines digital technologies and an advanced business model	1) Business model, (2) Structure, (3) People, (4) Processes, (5) IT capability, (6) Offerings, (7) Engagement model
	Digital Orchestra Framework (Wade et al., 2017)	Modiba et al. (2018) Nwaiwu (2018) Subramanian et al. (2021)	Replacement for the Digital Piano Framework. Grounded in the understanding that digital orchestras must first define: the strategic direction (music) and specific strategies (orchestration). It offers immense scope of enterprise-wide procedures and guidelines for the reinvention approach of DT	(1) Go-to-market, a. offerings b. channels (2) Engagement, a. customers b. partners c. workforce (3) Operations, a. processes b. IT capability (4) Organisation, a. structure b. incentive c. culture
	Integrated DT System Framework - IDTSF (Majdalawieh & Khan, 2022).		The framework allows enterprises to (1) Implement a single and integrated method that delivers value to the customers/users; (2) Set priorities to accomplish their strategic goals and objectives. (3) Keep up with digital trends to stay effective and relevant to the customers/users. (4) Seamlessly and rapidly integrate emerging technologies into their infrastructure; (5) Lower costs throughout the whole value chain	1. Business needs space, 2. Problem space, 3. Solution space, 4. Operational space, 5. Change management space
Innovation and Reinvention Viewpoint	Digital Reinvention Framework (Berman et al. 2016)	Modiba et al. (2018) Nwaiwu (2018) Subramanian et al. (2021)	For successful digital reinvention (of strategy, operations and technology), organisations need to pursue a new strategic focus, build new expertise, and establish new ways of working	(1) To pursue a new focus, (2) To build new expertise, (3) To establish new ways of working
	Digital Innovation Strategy Framework (Nylén & Holmström, 2015)	(Ciriello et al. (2018)) Modiba et al. (2018) Nwaiwu (2018) Subramanian et al. (2021)	Illustrates how digital technologies lead to organisations' vast product and service innovation potential. Managerial decisions must cut across three dimensions (1) products, (2) digital environment, and (3) organisational properties.	(1) User experience, (2) Value proposition, (3) Digital evolution scanning, (4) Skills, (5) Improvisation

### 3.4 Theoretical Framework

The theoretical framework for this study is adapted from an existing theory, the Adaptive Structuration Theory (AST). The AST is reviewed regarding the theory's propositions relevant to this study's purpose and research questions. Moreover, the concepts, assumptions, assertions, models, propositions, and predictions are the theory's contents considered for the theoretical framework development. The AST is considered together with other literature to determine the appropriate constructs and produce a theoretical framework purposely tailored to the needs of this research study to help explain the findings (Kivunja, 2018).

DeSanctis and Poole (1994, p. 122) “proposed AST as a framework for studying variations in organization change that occur as advanced technologies are used”. They further state that “the central concepts of AST, structuration and appropriation, provide a dynamic picture of the process by which people incorporate advanced technologies into their work practices” (DeSanctis & Poole, 1994, p. 122). According to AST, the adaptation of technology structures by organizational actors is a critical factor in organizational change. These assertions for AST constitute the main principles of DT and, for that matter, make AST one of the most suitable theories for studying DT.

Moreover, the proponents of AST, DeSanctis and Poole (1994, p. 131), summarise their propositions by stating that: “Given advanced information technologies (AIT) (*digital technologies*) and other sources of social structure (*drivers*) and ideal appropriation processes, and decision processes that fit the task at hand (*processes*), then desired outcomes of advanced information technology will result (*outcomes*)”. (The words in *parentheses* are mine for emphasis). This statement makes AST very suitable for this study, as it assumes the interplay of drivers, processes and outcomes in the organisational use of digital technologies.

Furthermore, Jones and Karsten (2008, p. 141) contend that “if group (organisation) interaction processes are inconsistent with *technology’s* structural potential (*drivers*), then the *outcomes* will be less predictable and generally less favourable”. This contention illustrates the “dialectic of control between the group (*organisation*) and the technology (*digital technology*)” (Jones & Karsten, 2008, p. 141). (The *parentheses* are mine). Meanwhile, these statements confirm the involvement of both organisations and digital technologies, as well as AST's drivers, processes, and outcomes. This involvement makes AST most suitable for DT research and this study.

### 3.4.1 Adaptive Structuration Theory (AST) Overview

The Adaptive Structuration Theory (AST) is used to explore the DT of SMEs in DCs. AST highlights the use of structuration theory in information systems (Jones & Karsten, 2008) and examines how advanced information technologies (AITs) are incorporated into organisations and work processes (DeSanctis & Poole, 1994). “AST focuses on social structures, rules and resources provided by technologies and institutions as the basis for human activity” (DeSanctis & Poole, 1994, p.125).

Although AST links social structure primarily to the structure provided by AITs, processes and organisations can also provide structure (DeSanctis & Poole, 1994). AST conceives that those structures result and takes various forms when technologies and organisations interact (Cao et al., 2013). These structures are embedded in the technologies, the organisational processes (both internal and external), and the social action and interaction of both technologies and organisations (Cao et al., 2013; DeSanctis & Poole, 1994).

Understanding organisational changes and, for that matter, the DT that pertains to these structures involves gaining insights into how they interact, which is the basis of this study. AST

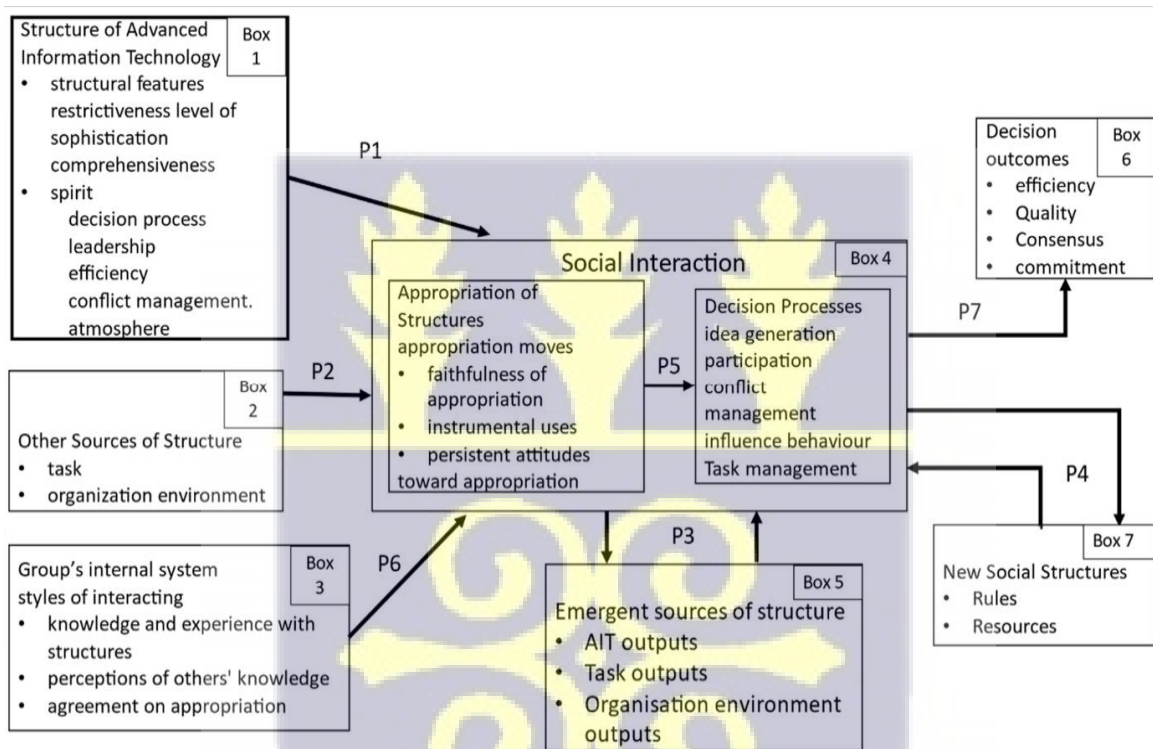
presents two significant concepts – structuration and appropriation. *Structuration* refers to the process of bringing rules, resources, and other structures into action, while *appropriation* refers to the application of these structures in a particular context (Cao et al., 2013; DeSanctis & Poole, 1994). For this study, the structuration brings the DT drivers, processes, outcomes, and SMEs capabilities and capacities into action and interaction. At the same time, the appropriation applies these DT drivers, processes, outcomes, and SMEs capabilities and capacities to the DT of SMEs in DCs.

DeSanctis and Poole (1994) argue that the use of any structure in digital technologies and, for that matter, DT is not sacrosanct since humans, as reflective agents, may use any aspects of the technology structures in any way they wish. This use is referred to as *appropriation moves*. The decision to appropriate a particular structure and its continuance depends on how favourable and satisfying the actual outcomes are (DeSanctis & Poole, 1994). The appropriation of structures, therefore, involves appropriation moves towards appropriation, which refer to how groups (organisations) adapt structures (digital technologies) (DeSanctis et al., 1991).

The *appropriation moves* involve *faithfulness of appropriation*, *instrumental uses*, and *persistent attitudes*. The *faithfulness of appropriation* refers to how structures (digital technologies features) are consistent or faithful to the technology's design intent (spirit). An appropriation move is considered faithful, if it is in line with the design intent for which it was created, or unfaithful, if used differently from the spirit of the technology (which is not necessarily bad). *Instrumental use* refers to the purpose of appropriation. Finally, a *persistent attitude* refers to the perceptions and feelings of users toward the structure (Cao et al., 2013).

DeSanctis and Poole (1994), while propounding the theory of Adaptive Structuration for understanding technology-induced organisational change, also proposed a comprehensive model or framework to this end. The model describes the interplay between advanced information technologies, social structures, and human interaction. The AIT bring a social structure which enables and constrains interactions in organisations for DT. The original AST framework reveals the implied propositions, constructs or variables, as shown in Figure 3.1.

**Figure 3.1 AST Framework**



*Note.* Summary of Major Constructs and Propositions of AST. From “Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory”, by G. DeSanctis and M. S. Poole, 1994, *Organisation Science*, 5(2), p. 132.

### 3.4.2 Propositions of the Adaptive Structuration Theory (AST)

The propositions of the AST model provide a sound basis for relating the AST to the DT of organisations. Seven propositions are provided for the AST (DeSanctis & Poole, 1994).

*P1: AITs provide social structures that can be described in terms of their features and spirit.*

*To the extent that AITs vary in their spirit and structural features sets, different forms of social interaction are encouraged by the technology.* This proposition implies that digital technologies and their structural and spirit features act as drivers for the DT of organisations.

*P2: Use of AIT structures may vary depending on the tasks, the environment, and other contingencies that offer alternative sources of social structures.* This proposition suggests that the drivers of DT vary depending on the organisation's task, internal and external environment.

Hence the task, internal and external environment are sources and forms of DT drivers.

*P3: New sources of structure emerge as the technology, tasks, and environmental structures are applied during social interaction.* This proposition means that in the DT of organisations, as organisations interact with digital technologies, new forms and sources of drivers arise due to the interactions, which are different from the direct technologies or organisation drivers.

*P4: New social structures emerge in group interaction as the rules and resources of an AIT is appropriated in a given context and then reproduced in group interaction over time.* This proposition also implies that new drivers emerge as rules and resources are introduced to enable the DT of organisations.

*P5: Group decision processes will vary depending on the nature of AIT appropriations.* This proposition suggests that the decision outcomes of DT may be affected by the nature of the processes involved in the use of digital technologies.

*P6: The nature of AIT appropriations will vary depending on the group's internal system.* This proposition also indicates that the nature of the DT processes may vary depending on the drivers of DT resulting from the organisational internal system.

*P7: Given AIT and other sources of social structure, ideal appropriation processes, and decision processes that fit the task, the desired outcomes of AIT use will result.* This proposition confirms that the DT drivers from the digital technologies and organisation are related to the interactions and processes of DT and further influence the DT outcomes.

Put together, all the propositions suggest that the drivers, processes and outcomes of DT interrelate and influence one another.

### **3.4.3 Constructs of the Adaptive Structuration Theory (AST)**

In terms of constructs and variables, the digital technology structure has structural features of customisability, adaptability, reactivity, level of application, availability, accessibility, usability, flexibility, and comprehensiveness (Al Maamari & Bhuiyan, 2021; Alraja et al., 2021; Liere-Netheler et al., 2018; Morakanyane et al., 2017; Osmundsen et al., 2018). Besides, there are spirit features of efficiency, effectiveness, timeliness, and accuracy (Al Maamari & Bhuiyan, 2021; Hrustek et al., 2019; Ismail et al., 2017; Liere-Netheler et al., 2018;).

The task sources of structure comprise the content and constraints of work tasks and task accomplishments (Hrustek et al. (2019); Ismail et al., 2017; Liere-Netheler et al., 2018; Pihir et al., 2018). The organisation's internal sources of structure include corporate information, cultural beliefs, modes of conduct, decision process, leadership, style of interaction, conflict management, atmosphere, knowledge, structure, resources and competencies, perceptions and understanding of appropriation (Al Maamari & Bhuiyan, 2021; Hrustek et al. 2019; Ismail et al., 2017; Liere-Netheler et al., 2018; Pihir et al., 2018; Tarutè et al., 2018). The organisation's external environment includes customer demand, competition, regulation, industry, and government (Berghaus & Back, 2017; Ismail et al., 2017; Piccinini et al., 2015).

The technology, tasks, internal and external sources of structure together produce social interaction or structuration. The interaction involves appropriating structures (including appropriation moves, the faithfulness of appropriation, instrumental uses, and persistent attitudes towards appropriation) (DeSanctis & Poole, 1994). Furthermore, it involves decision processes (idea generation, participation, conflict management, influence behaviour and task management). The appropriation and decision processes result in new sources of structure, including new rules, policies, systems, and resources (DeSanctis & Poole, 1994).

Moreover, the structuration and appropriation produce emergent sources of structure (the outputs of the digital technologies, tasks, organisation, environment, and their interactions). These emergent sources of structure include cost reduction, change in business model, and increased productivity and profitability, which further influence the appropriation (Berghaus & Back, 2017; Isaksson & Hylving, 2017; Liere-Netheler et al., 2018; Mocker & Fonstad, 2017; Morakanyane et al., 2017). The social interactions of appropriations and structuration could represent the processes involved in DT, which involve technology interaction with organisations.

Eventually, the AST specifies the dependent variables of decision outcomes as consensus, commitment, efficiency, effectiveness, and quality (DeSanctis & Poole, 1994).

#### **3.4.4 Criticism of the AST**

The *first criticism* is the assertion that structures exist within technologies. Accordingly, some IS researchers have suggested the needlessness to study pre-existing structures in technologies because technology-associated structures constantly evolve (Jones & Karsten, 2008). However, other studies believe the changing structure over time, as a result of the technology evolution,

calls for its study and periodic review (Hanelt et al., 2021; Solis & Littleton, 2017; Verhoef et al., 2021). It is shown that technology-associated structures impact technology development and influence other consequences like the firm's agility and resilience (Ignatiadis & Nandhakumar, 2007).

The *second criticism* is the conceptualisation of the quality of appropriation of structures. Appropriation is related to the choice of human actors to endorse structure, and AST emphasises both existing and emergent structures. However, some studies claim that only existing structures matter and that the extent to which human actors appropriate the structures has an enormous effect on the outcomes (Chu & Robey, 2008). Meanwhile, emergent structures are emphasised by other researchers instead of entrenched structures (Orlikowski, 2000).

Therefore, both entrenched or existing and emergent structures are significant in appropriation. Hence, AST offers much potential in research when socio-technical interaction (appropriation) is of interest and is more robust than other theories (Bostrom et al., 2009). This study focuses on DT, which requires the socio-technical interaction of organisations and technologies. Meanwhile, though AST was initially applied in studying group interaction with decision support systems (DeSanctis & Poole, 1994), it is now considered for any socio-technical interaction involving individuals, organisations or societies with technologies.

The *third criticism* is that AST lacks assumptions and methodological guidelines (Joseph, 2006). No particular methodological approach is prescribed for using AST in the extant literature. However, this lack cannot be considered a weakness in the theory. Therefore, different methodological approaches can be applied to the use of AST. Regarding the need for appropriate methodological guidance, this study proposes using expert opinion through the

Delphi technique to unearth the phenomenon of structuration and appropriation of technology (Berbel-Vera et al., 2022). Meanwhile, AST has been combined in some research to unearth the mechanisms behind water resource problems with a Geographic Information System (Nyerges et al., 2006). This approach is essential since the appropriation and structuration are appreciated through experience and practice. Hence, using expert opinion through Delphi techniques with a qualitative approach offers a suitable methodology for using the AST in the study of DT.

### **3.4.5 Prior Research with AST**

AST has been extensively used in evaluating AITs relating to group decision support systems (Bostrom et al., 2009; DeSanctis et al., 2008). While using AST as the theoretical lens, a study shows that leadership competence ensures organisation competence, focusing on managerial and organisational capabilities (Cecilia, 2020). Furthermore, Pesonen (2020) show that AST can be used to show how organisations can succeed in their DT route as it brings out the mechanisms of interaction involving management and leadership with technology. AST has also been used to explain attitudes toward and experiences with social media among public information officers (Shiel et al., 2011)

Amid the COVID-19 challenges and the opportunities for DT, AST has shown how leadership transformation can lead to employee performance in SMEs' digital communication context (Thapa et al., 2022). In the study, AST reveals and explains the interactions among leaders, employees, technologies, and organisations (Thapa et al., 2022). Another COVID-19 research uses AST to study the requisite characteristics and antecedents for a web-based digital platform that facilitates virtual education and training. Furthermore, a COVID-19 era study aimed to

uncover the relationships between digital leadership and organisational change that contribute to SMEs' DT, using AST as the guiding theory (Veeraya et al., 2021).

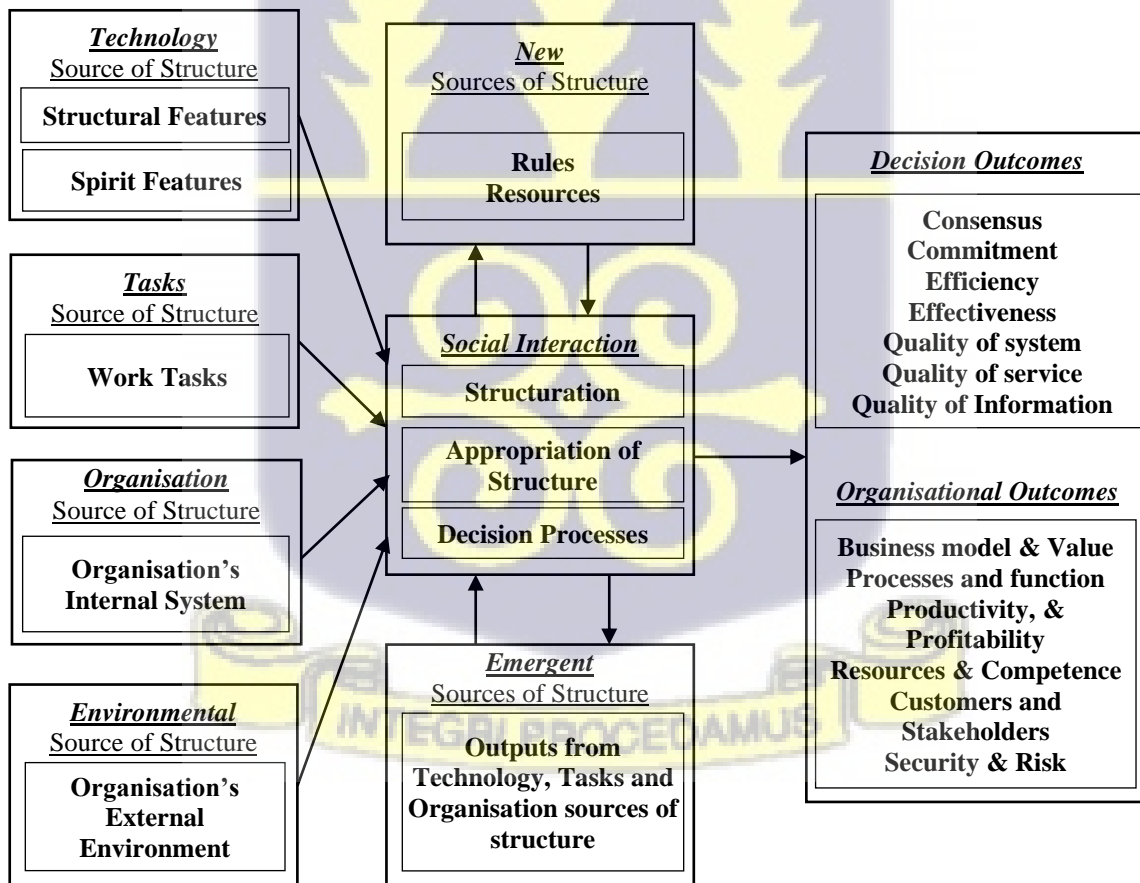
Other research articles applied AST in artefact appropriation and structuration analysis of innovation communication among SMEs (Pari, 2020; Tavella et al., 2021). On the other hand, Dehnert's (2020) considers how IT support influences organisational transformation. Meanwhile, Suwandi et al. (2020) studied technology's action on SMEs' development. All these studies point to the use of AST in the DT of SMEs. Contemporary IS concepts such as DT and digital technology adoption emanate from creating new social and organisational structures driven by new and advanced digital technologies. Thus, AST's potential applicability in explaining digital technology adoption and DT of SMEs is evident (Tavella et al., 2021).

### **3.4.6 Theoretical Framework for the Study based on AST**

The AST framework was revised and adapted to form the basis of the theoretical framework for this research. The revision and adaptation were based on the AST and its structures, structuration, appropriations, outcomes, constructs and propositions from DeSanctis & Poole (1994). Some constructs and variables from other literature sources were considered to complement the AST regarding the outcomes. The technology, organisation and environmental sources of structure as drivers are shown together with the task drivers as work tasks. These together produce structuration and appropriation as processes that result in new and emergent sources of structure as drivers. The new and emergent drivers further influence the structuration and appropriation and eventually result in Consensus, Commitment, Efficiency, Effectiveness and Quality outcomes.

The quality outcome was divided into the system, service, and information dimensions. These three dimensions of quality were deduced from the inputs of the Delone and McLean Information Systems Success Model (Delone & McLean, 2003). Other dependent constructs that were considered from literature as DT outcomes for the theoretical framework include business model and value, processes and function, productivity and profitability, resources and competence, customers and stakeholders, and security and risk (Bui, 2021; Pousttchi et al., 2019; Reinartz et al., 2019; Schwarzmüller et al., 2018; Vial 2019; Yousaf et al., 2021). The resulting framework, serving as the study's theoretical framework, as adapted from the AST, is presented in Figure 3.2.

**Figure 3.2** *The theoretical framework for the Study*



*Note.* Source: Researcher's Constructs, adapted from the AST Framework with other literature

### **3.5 Conceptual Framework**

The conceptual framework for this study is derived from the theoretical framework obtained from the AST theory and reviewed literature in the previous sections of this chapter and the methodological and philosophical approaches of the study. The conceptual framework for the study is developed as a combined framework from the distinct conceptualisations of the DT drivers, processes, outcomes and SMEs capabilities and capacities. The distinct conceptualisations and the factors derived categories towards the conceptual framework development are presented in the following sub-sections.

#### **3.5.1 Conceptualising the Drivers of DT**

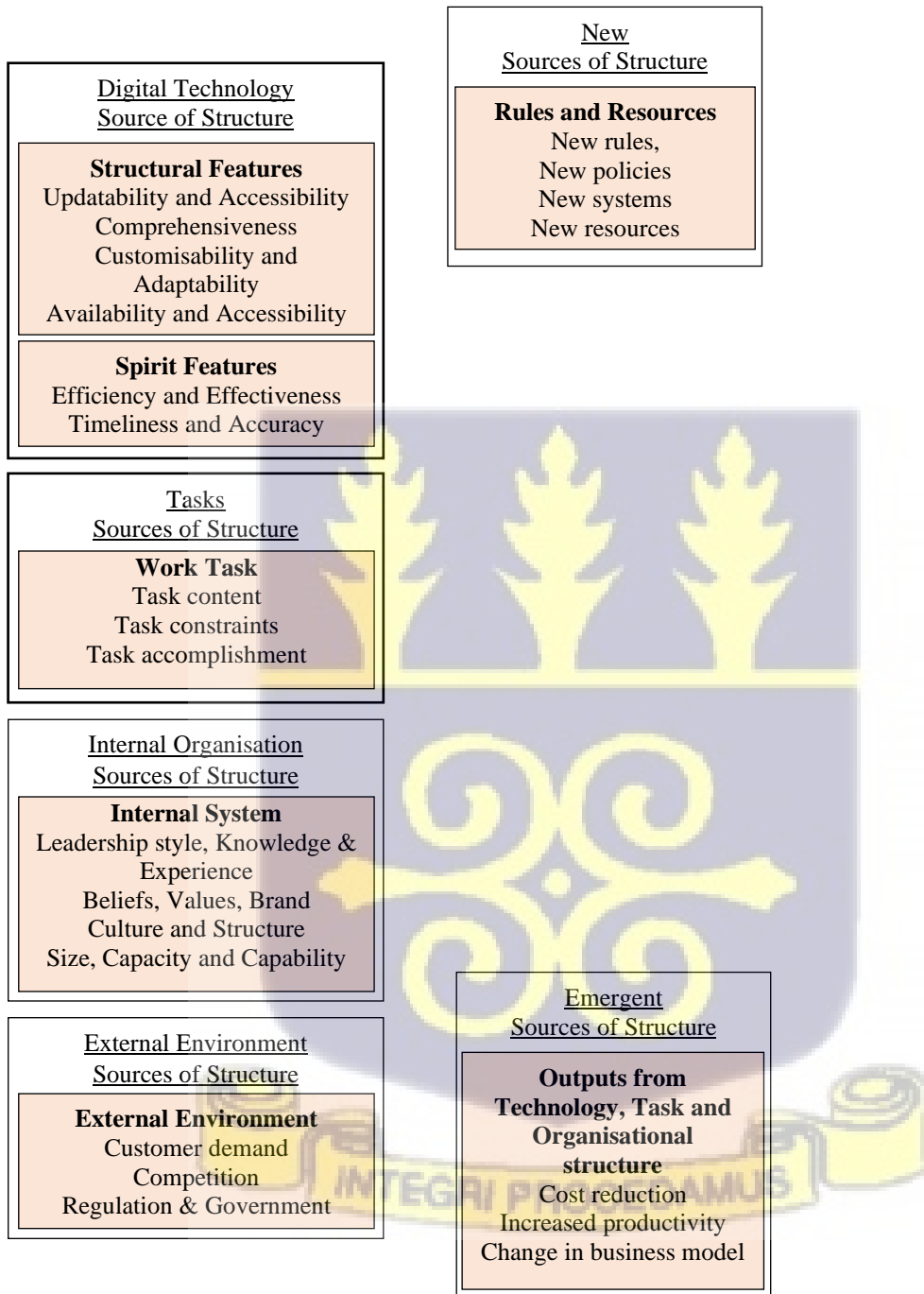
The conceptualisation of the DT drivers is based on the theoretical framework in Section 3.4 and the reviewed literature in Section 2.4. For this study, the DT drivers are the technology's structural features of updatability, comprehensiveness, availability, flexibility, usability, and spirit features of timeliness, accuracy, effectiveness, and efficiency (Morakanyane et al., 2017; Nwankpa & Roumani, 2016). The organisation's internal system involves management support, employee enthusiasm, knowledge and experience with the technology, and agreement with the appropriation and cultural beliefs (Al Maamari & Bhuiyan, 2021; Pihir et al., 2018).

The external environment involves customer demands, market pressure, competition, partnerships, regulation laws, and government (Ismail et al., 2017; Liere-Netheler et al., 2018).

The work tasks involve the content, constraints, and accomplishment of tasks (Ismail et al., 2017; Liere-Netheler et al., 2018). The new sources of structure include new rules, policies, systems, and resources (DeSanctis & Poole, 1994). In contrast, the emergent sources of structure involve outputs of the technology, tasks, organisation's internal and external environment, and their interactions, including cost reduction, change in business model and

increase in productivity and profitability (DeSanctis & Poole, 1994). The categories of the DT drivers of SMEs in DCs from the conceptualisation are represented in Figure 3.3.

**Figure 3.3 Categories of the Drivers of DT**



Note. Source: Researcher's Constructs

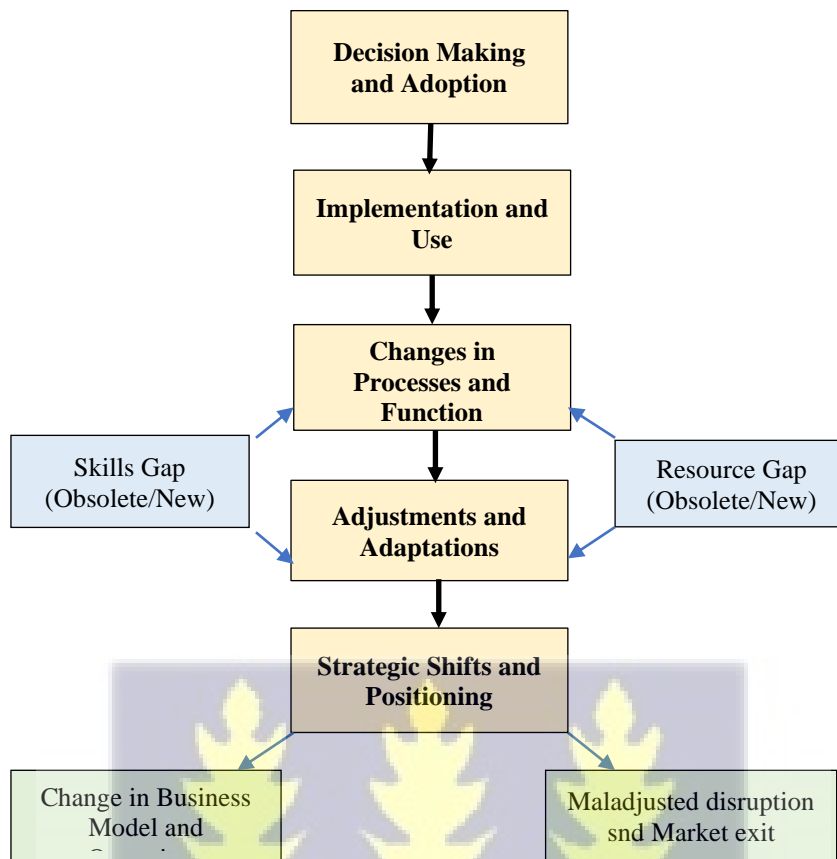
### 3.5.2 Conceptualising the Processes of DT

The conceptualisation of the DT processes is based on the theoretical framework in Section 3.4 and the reviewed literature in Section 2.5. The DT processes are determined by examining the general pattern of events, activities, and individual steps to adopt, implement, use, adapt and strategize to achieve successful DT. Examining the critical processes and summarising give a simple five-stage DT processes approach.

The first step in the DT trajectory involves deciding on digital technology adoption and use. Several factors equally drive the decision initiation process. However, digital technology decision-making, and adoption, are indispensable in the DT path (Saleh & Manjunath, 2020; Ziyadin et al., 2019). Once a firm adopts digital technology, the next step may involve implementation and use. The implementation may include digitisation, digitalisation, and shifting from manual to automated digital systems such as an e-commerce platform (Barann et al., 2019; Vial, 2019). Digitalisation may result in changes in function and processes, leading to discoveries of skills and capacity gaps, necessitating adjustments and adaptations with digital competence and capacity development as a subsequent step (Hönigsberg & Dinter, 2019; Kane et al., 2017).

Strategic shifts and positioning may then occur with the development of digital business models and capabilities, product and service orientation, and data-driven approaches (Liere-Netheler et al., 2018; Parida et al., 2019). However, maladjustment may occur due to capabilities and capacities-related challenges, industry-related constraints, the nature of the digital technology architecture, or the business environment (Boneva, 2018; Ivančić et al., 2019). These processes form the basis for elucidating the processes of SMEs' DT in DCs in this study, as shown in Figure 3.4.

**Figure 3.4** *The Processes Flow and Activities of DT*



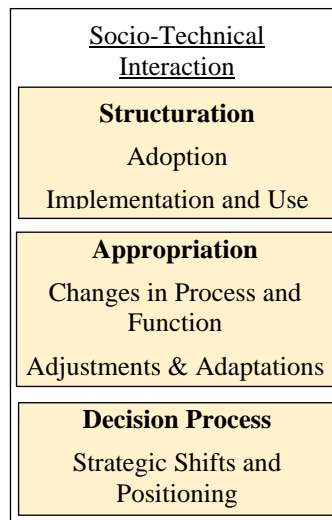
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Processes of DT	Process linked Capability and Capacity	Process linked Outcomes	Processes flow direction	Other in/outflows
			→	→

*Note.* Source: Researcher's Constructs

The processes defined are integrated into the theoretical framework to conceptualise the DT processes for the study. The processes fit within the socio-technical interactions portion of the theoretical framework where structuration, appropriation, and decision-making occur. The adoption, implementation, and use suites the structuration, whereas the changes in processes and function and the adjustments and adaptations also fit the appropriations. Meanwhile, the strategic shifts and positioning also suit the decision processes. The resulting categories of the DT processes from the conceptualisation are shown in figure 3.5

**Figure 3.5 Categories of the Processes of DT**



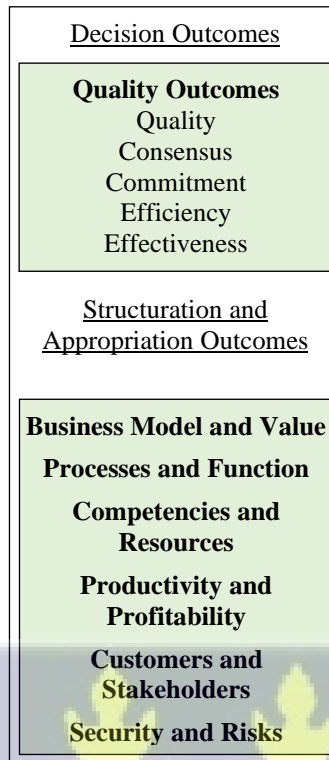
*Note.* Source: Researcher's Constructs

### 3.5.3 Conceptualising the Outcomes of DT

The conceptualisation of the DT outcomes is based on the theoretical framework in Section 3.4 and the reviewed literature in Section 2.6. The outcomes of DT on SMEs are measured as the decision outcomes and the structuration and appropriation outcomes in the theoretical framework (DeSanctis & Poole, 1994). This study's specific outcomes include the productivity and profitability measures of cost savings, incremental sales, process and function measures of time savings, job effectiveness and simplification, task performance, and innovation.

Other outcome measures include business models, value creation and market outcomes (Mocker & Fonstad, 2017). A further measure of outcomes includes resource and competence related outcomes, customer and stakeholder outcomes and security and risks outcomes (Mahmood et al., 2019; Pousttchi et al., 2019). In addition, the decision outcomes involve quality, consensus, commitment, efficacy, and effectiveness. The categories of the outcomes of DT from the conceptualisation are shown in Figure 3.6.

**Figure 3.6** *Categories of the Outcomes of DT*



*Note.* Source: Researcher's Constructs

### 3.5.4 Conceptualising the Capabilities and Capacities of SMEs

The conceptual framework for the DT drivers is based on the theoretical framework in Section 3.4 and the reviewed literature in Section 2.7. The study envisioned that SMEs' managerial and organisational capabilities and capacities could influence DT's drivers, processes, and outcomes. Conceptually, the capabilities and capacities of the SMEs in this study are guided by the DMC concept expressed in terms of managerial cognition, social capital, and human capital (Helfat & Martin, 2015; Li et al., 2018). It is also guided by organisational capabilities and capacities literature (Sousa & Rocha, 2019; Tarutè et al., 2018; Wiliandri, 2020), as explained in Section 2.7. Four significant factors, namely: managerial capabilities, managerial capacities, organisational capabilities, and organisational capacities, are considered.

For this study, *managerial capabilities* involve managerial cognition of personal beliefs and values, rational principles, understanding and sensitivity, the managerial social capital of networks, and informal and formal relationships (Ambrosini & Altintas, 2019; Helfat & Martin, 2015). The *managerial capacities* comprise knowledge, experience, skills, education, and training (Al Maamari & Bhuiyan, 2021). Meanwhile, the *organisational capabilities* include competence, research and development output, service delivery and competitive advantage (Anderson & Adams, 2019). The *organisational capacities* involve resources, infrastructure, and facilities (Weritz et al., 2020; Zhou et al., 2019). The categories of the SMEs' managerial and organisational capabilities and capacities from the conceptualisation are summarised in Figure 3.7.

**Figure 3.7 Categories of the Capabilities and Capacities of SMEs**



Note. Source: Researcher's Constructs



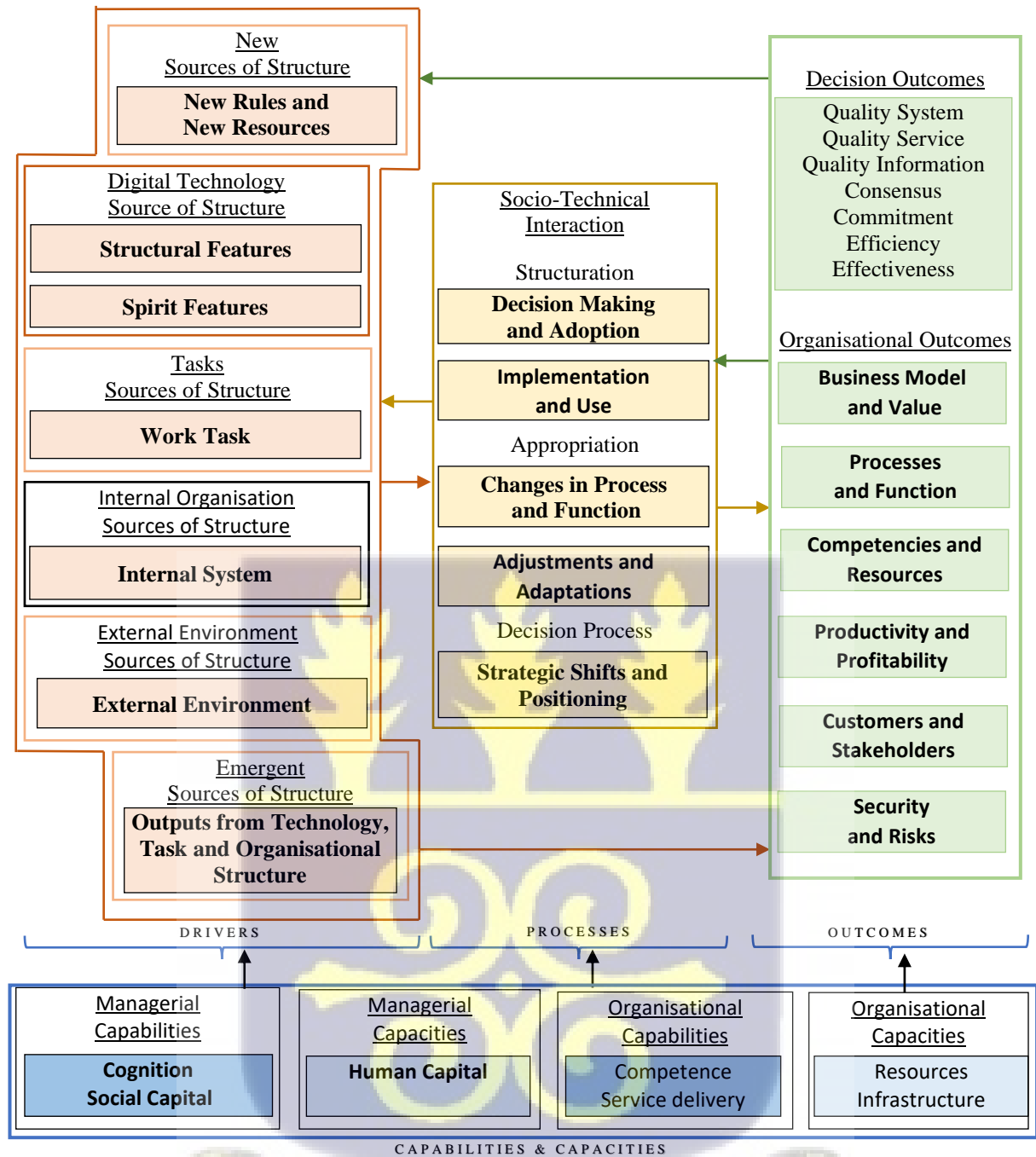
### 3.5.5 Integration of the Distinct Conceptualisations

The distinct conceptualisations with the derived categories from the previous sub-sections (3.5.1, 3.5.2, 3.5.3, 3.5.4) with respective figures 3.3, 3.5, 3.6, and 3.7 are combined to form an integrated conceptualisation. This integration of the distinct conceptualisations results in the pre-study conceptual framework. The combination is to create a conceptual framework that conceptualises the DT drivers, processes, outcomes, capabilities and capacities. This conceptual framework then guides the study and is utilised in the data collection and analysis.

The pre-study conceptual framework assumes that, per the research questions, the study seeks to discover the DT factors and their relationships and influences (Hrustek et al., 2019). Thus, drivers may influence processes and outcomes; processes may influence outcomes and drivers, while outcomes may influence drivers and processes (Hrustek et al., 2019). At the same time, the capabilities and capacities may also influence the drivers, processes, and outcomes.

This conceptual framework helps determine the drivers, processes, outcomes, and capabilities and capacities of the DT of SMEs in DCs. It also helps to examine the influences among the drivers, processes, and outcomes of DT of SMEs in DCs. Furthermore, it facilitates understanding the SMEs capabilities and capacities to influence the DT drivers, processes, and outcomes. Figure 3.8 shows the integrated framework and represents the factors of drivers, processes, outcomes, capabilities and capacities and their possible relationships and influences. This *pre-study conceptual framework* is decomposed in terms of complex constructs and variables to form the *decomposed pre-study conceptual framework* shown in Figure 3.9.

Figure 3.8 Pre-Study Conceptual Framework for the DT of SMEs

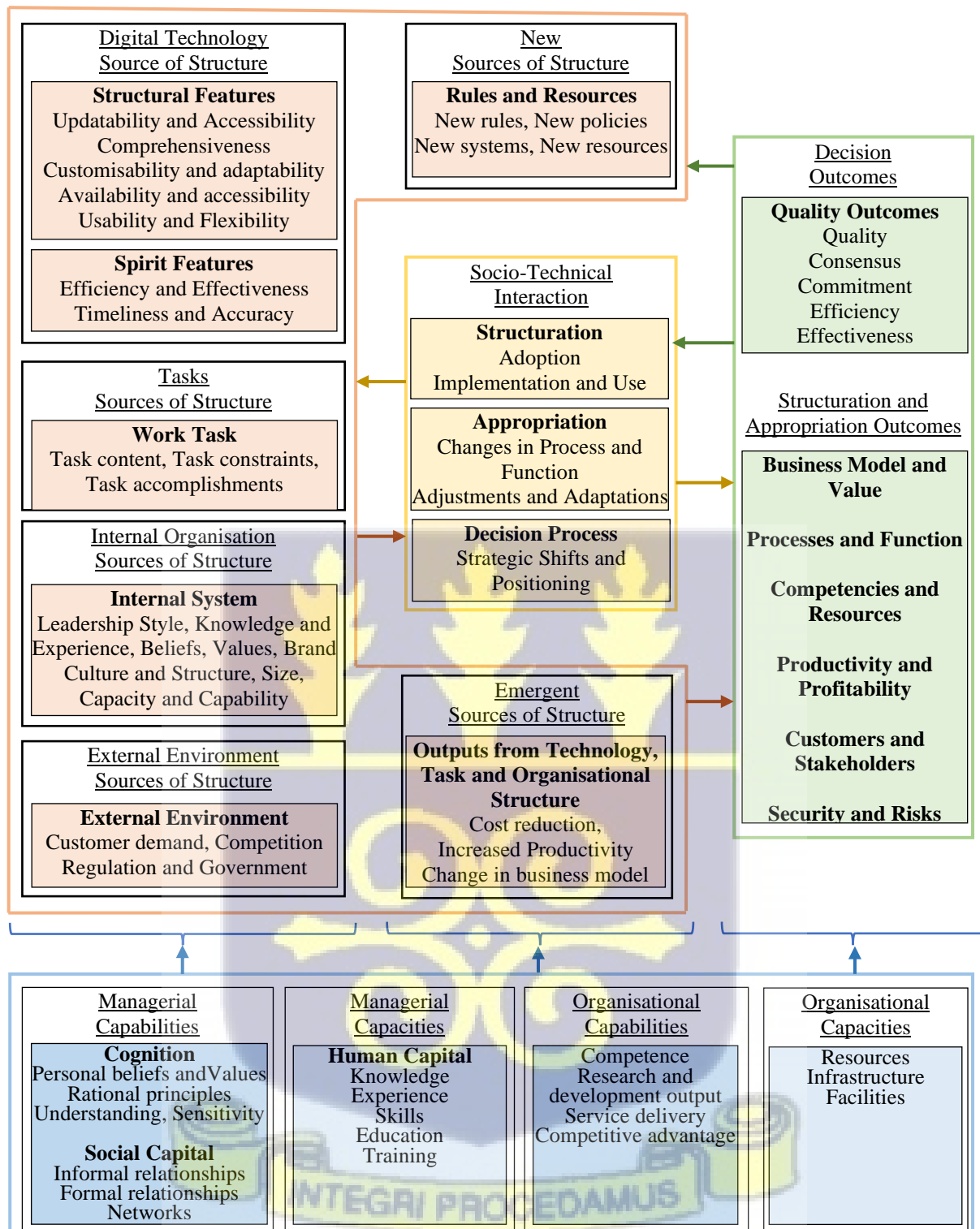


**Legend**

→	→	→	→	→
Drivers	Processes	Outputs	Capabilities	Capacities

Note. Source: Researcher's Constructs

**Figure 3.9 Decomposed Pre-Study Conceptual Framework for the DT of SMEs**



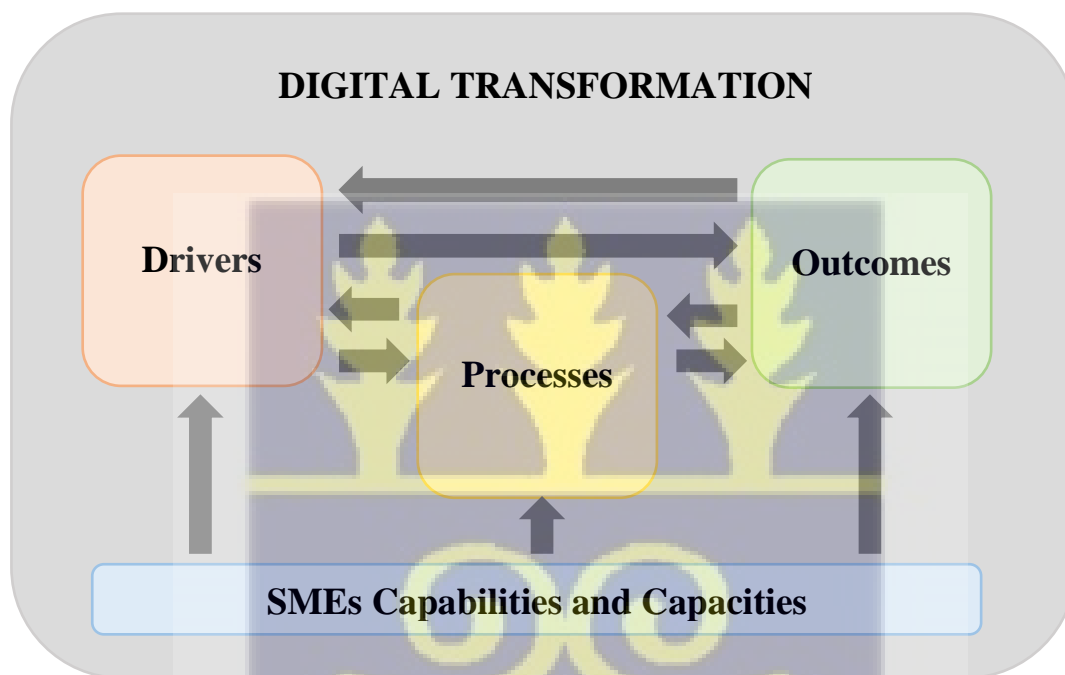
**Legend**

Drivers	Processes	Outputs	Capacities	Capacities

Note. Source: Researcher's Constructs

The pre-study conceptual framework is further simplified in design using the broad categories that summarise the DT factors of drivers, processes, and outcomes, as well as the influencing relationships among the drivers, processes, outcomes capabilities, and capacities. The simplification results in the final conceptual framework used for the study and is shown in Figure 3.9,

**Figure 3.10 Simplified Pre-Study Conceptual Framework of DT of SMEs**



Legend for Figure 3.10

				➔
Drivers	Processes	Outcomes	Capabilities and Capacities	Influence Direction

Note. Source: Researcher's Constructs

### 3.6 Chapter Summary

Theory, model, theoretical and conceptual frameworks were explained. A review of existing theories, models and frameworks used in IS and DT research was presented. The AST was reviewed regarding its concepts, constructs, criticisms, and prior research. The AST was seen to be suitable for identifying the drivers, processes and outcomes of the DT of SMEs. A theoretical framework was established from the AST. Distinct conceptualisations were made, and categories were derived for DT drivers, processes, outcomes and SMEs capabilities and capacities from the theoretical framework and other literature. The pre-study conceptual framework was developed by combining distinct conceptualisations and categories. The conceptual framework was further simplified in design to constitute the pre-study conceptual framework for the DT of SMEs.



## CHAPTER FOUR

### 4 RESEARCH METHODOLOGY

#### 4.1 Chapter Overview

This chapter discusses the procedures and techniques for strategizing, collecting, and analysing data to generate valid and reliable information. The research methodology of this study is presented in four sections. The first section discusses the research strategy, which comprises the study's philosophical assumptions and paradigm, the qualitative research approach, the research design and technique used, the sampling strategy and the profile of expert participants. The second section presents data collection, which involves the instruments used, preparations and the three rounds of Delphi. The third section considers the data analysis with analytical process framework development and the analysis based on preliminary inquiries and research questions. The fourth section presents the ethical considerations.

#### 4.2 Research Strategy

The research strategy provides a direction to the study and helps choose the suitable methodology for collecting and analysing the data. The research strategy explains the research paradigm, design, approach or methods, and sampling strategy. DT is a contemporary phenomenon with structures that need to be unearthed and explored to clarify its understanding and applications.

Hence the research strategy encompassed critical realism philosophy, qualitative approach, Delphi technique design, and purposive sampling. Meanwhile, the lack of agreement on DT

factors and incomplete knowledge of the DT phenomenon further justifies the research strategy involving the purposive selection of experts for their opinions through an exploratory qualitative approach with a Delphi method and critical realism perspective. The philosophy, approach, design and sampling are explained in the following subsections.

#### **4.2.1 Research Philosophy**

Fundamentally, researchers are guided by underlying assumptions about what constitutes 'valid' research and which philosophy is appropriate for developing knowledge in each study (Khaldi, 2017). Philosophies as worldviews offer different beliefs about what can be known and how it can be known. It shapes the research questions, the research approach employed, and the data collection and analytic methods used (Wright et al., 2016). There must be alignments among ontology (what can we know?), epistemology (how can we know it?), methodology (what approach should be used?), and data collection and analysis methods (what specific tools should be used?).

Ontological viewpoints can be placed on a continuum. Some researchers believe that an observable reality exists independent of our knowledge (objectivist, positivist view). Other researchers believe this reality is subjective and constructed philosophically, without universal "truth" (interpretive, constructive view) (Wright et al., 2016). Epistemological positions also can be placed on a continuum, influenced by the researcher's ontological viewpoint. For example, the positivist worldview is based on the belief in objective reality and truth to be discovered (Singh & Walwyn, 2017). Therefore, knowledge is produced through objective measurements and the quantitative relationships between variables (Wright et al., 2016).

In contrast to the views explained above, the realism philosophy believes that reality exists in the environment and that external and objective reality influences people's social interpretations and behaviour (Vincent & O'Mahoney, 2018). *Critical realism* is a philosophical approach to research that combines a general philosophy of natural science with a philosophy of social science to provide an interface between the natural and social world (Wynn & Williams, 2020). The critical realist paradigm or worldview is that "reality" cannot be observed and exists independently of human perceptions, theories, and constructions. Thus, critical realism accepts that knowledge is always local and historical (epistemic relativity), but there is no judgmental relativity, and, therefore, all viewpoints are equally valid (Vincent & O'Mahoney, 2018).

This study applied the critical realism research philosophy or paradigm in the research approach, design, sampling, data collection, analysis, conclusions, and verification of findings. This study's critical realism application is underpinned by the fundamental understanding that different individuals have varied knowledge, perception, and judgment concerning any phenomenon such as DT. Critical realism accepts that different knowledge (physical, social, and conceptual phenomena) has different ontological and epistemological characteristics (Wynn & Williams, 2020). Therefore, collecting different ideas about DT presents an opportunity to understand DT issues and phenomena among SMEs in DCs. In line with the critical realism philosophy, the study employed the qualitative approach and Delphi method for data collection and the three-step thematic analysis based on Bazeley (2009), Gioia et al. (2013) and Strauss (1987) to achieve the study's aim.

#### 4.2.2 Research Approach

The choice of research approach depends on the researcher's philosophical assumptions, the nature of the research problem, the procedures of inquiry and specific research methods of data collection, analysis, and interpretation (Wynn & Williams, 2020). This study adopts a qualitative research approach using the exploratory Delphi method and is aligned with the critical realism philosophical assumption. According to Basias and Pollalis (2018), the choice of research approach significantly influences the integrity of the study's findings and the overall success of the research endeavour. Careful consideration of the three distinctive research approaches, namely qualitative approach, quantitative approach, and hybrid or mixed-method approaches, was undertaken before the choice of the research approach for this study was made (Kumar, 2019).

The qualitative approach focuses on unearthing meaning from experience, opinions, and ideas in a qualitative and non-numeric fashion (Merriam, 2002). The qualitative approach requires immersing oneself in a phenomenon to understand it better (Miller et al., 2018). In the qualitative approach, the researcher listens, asks questions, observes a phenomenon, gathers the material and data, and analyses them to obtain findings (Miles & Huberman, 1994). The quantitative approach has a notion of the constancy of reality. However, the notion of “multiple realities” constantly changes and transitions in the qualitative approach. Therefore, the context of the phenomenon or subject under study matters for the qualitative approach or viewpoint. The findings can only be tentatively generalised to situations with similar contexts and circumstances.

Yilmaz (2013) offers two questions that help decide whether to use qualitative or quantitative approaches: “Are you interested in causal relationships and want to explore correlations

between different variables?” Alternatively, “Are you interested in people’s subjective experiences and the meaning they attribute to phenomena and what happens in their daily lives?” An affirmative answer to the former question necessitates using a quantitative approach, while the latter also gives ground for using a qualitative approach (Yilmaz, 2013). This study was designed to explore individual experts’ experiences and opinions about SMEs’ DT in DCs; hence, the qualitative approach was deemed the most suitable.

Against this backdrop, the qualitative approach is more favourable and suitable for this study than its quantitative counterpart (Khaldi, 2017). The qualitative approach enables the researcher to collect and use words, narratives, and other non-numeric measures (Yilmaz, 2013), which suits most DT research. Meanwhile, Savastano et al. (2019) review confirm that qualitative approaches are much more used in DT research.

#### **4.2.3 Research Design**

This study explores the drivers, processes and outcomes of DT and the inter-relationships among them while considering the influence of the SMEs capabilities and capacities in DCs. This study aims to address a complex and technical issue that requires the knowledge and experience of experts involved in the DT activities of SMEs in DCs (Lang et al., 2018; Skinner et al., 2015). The only method in research design that systematically collects and compiles opinions from a group of anonymous experts and reviews by same until some consensus is reached is the Delphi method (Brady, 2015; Kaiser, 2009; McPherson et al., 2018). The Delphi method has been a popular strategy used in IS research (Cech & Tellioglu, 2019; Hartl & Hess, 2017; Skinner et al., 2015; Strasser, 2017). Delphi's use in IS research is due to the robust nature of most information systems research's strategy and the technical nature, which calls for experts’ opinions (Skinner et al., 2015).

The Delphi research strategy or technique is a forecasting process framework developed from multiple rounds of interview and questionnaire administration to anonymous experts whose responses are aggregated, shared, and validated (Kaiser, 2009; Skinner et al., 2015; Tiberius & Hirth, 2019). The method involves obtaining a reliable consensus among experts' opinions through iterations of questionnaire administration or interviews (Fletcher & Marchildon, 2014; Fletcher & Marchildon, 2018). Most often, Delphi studies begin with open-ended or semi-open-ended questions. As data are collected, the questions become more structured in subsequent iterations with close-ended questions to verify the previous consensus, evaluate prepositions, and finalise decision-making models (Brady, 2015; McPherson et al., 2018).

The experts are usually a panel of purposively selected persons known widely to be experts in the subject or topic under investigation (Fletcher & Marchildon, 2014; Fletcher & Marchildon, 2018).

The Delphi method is most suitable when statistical survey methods are unsuitable (Humphrey-Murto & de Wit, 2019). It is also suitable when several experts are available or where there is the need to acquire expert recommendations in addressing an IS research issue (Humphrey-Murto & de Wit, 2019; Skinner et al., 2015; Strasser, 2017). Baybutt (2018) has also indicated that Delphi Method should be used when individuals' judgment is needed to address a lack of agreement or incomplete knowledge of a particular phenomenon. Extant literature has several methodological guidance for using the Delphi method with quantitative and mixed methods studies. However, some guidance exists solely on qualitative data (Fletcher & Marchildon, 2014; Fletcher & Marchildon, 2018), and the qualitative Delphi method is highly recommended.

Meanwhile, the application of DT Delphi methods, particularly the qualitative Delphi techniques for DT research, is very scanty in extant literature (E.g., Cech & Tellioglu, Chang et al., 2021; 2019; Fonseca & Picoto, 2020; Hartl & Hess, 2017; Piccinini et al., 2015; Sahu et al., 2018). However, Habibi et al. (2014) have argued that the Delphi technique is of more qualitative approaches than quantitative. The reason is the smaller size of participants of not more than 30 who are experts in the subject of enquiry and are expected to give detailed and more profound constructive knowledge about a phenomenon, with iterative rounds of questioning, which are all attributes of the qualitative research approach (Habibi, 2014; Sekayi & Kennedy, 2017).

The qualitative Delphi approaches emphasise open-ended and semi-structured questioning in earlier rounds and interviews (Fletcher & Marchildon, 2018). Meanwhile, in-depth interviews with experts have been used successfully as an alternative to or supplementary to questionnaires (Kelley-Quon, 2018). With qualitative Delphi, interviewing is helpful since the exercise is not designed to be statistically significant but to elicit ideas that can be important to subsequent analyses. Moreover, in-depth expert interviews are an excellent means of obtaining such ideas, particularly in the first round of questioning (Kelley-Quon, 2018). Sekayi and Kennedy (2017) also recommend that a round of interviews follow the Delphi questionnaire to enhance rigour. The triangulation questionnaire with interviews permits more rich data collection, leading to a deeper understanding of the fundamental research questions (Alarabiat & Ramos, 2019).

The multiple rounds in Delphi aim to reach a consensus by reducing the variances in responses and improving precision (McPherson, Reese & Wendler, 2018). Though the literature provides little guidance for the acceptable number of iterations, most Delphi studies use two to six

rounds (McPherson et al., 2018; Sekayi & Kennedy, 2017). Standard Delphi studies typically have three rounds or waves of data collection that begin with a questionnaire developed by the researcher, usually from the literature or what is thought to be known about the topic. The second wave or round in Delphi studies allows participants to provide feedback on the first-round responses.

Finally, the third wave of the Delphi method uses a questionnaire developed from the previous two waves to find a final consensus on a given topic of inquiry. If consensus is not found, additional data collection rounds may follow until a consensus is reached (Brady, 2015; McPherson et al., 2018). Most studies recommended three rounds of iterations, and this study would not be an exception (Alarabiat & Ramos, 2019; Brady, 2015; Delbecq et al., 1975; Humphrey-Murto & de Wit, 2019; McPherson et al., 2018). Meanwhile, the third or final round, also referred to as a “final member check” ensures the integrity, accuracy and trustworthiness of responses to enhance the rigour of the qualitative Delphi study (Aunguroch et al., 2020; Koelsch, 2013; Koelsch, 2018).

Analysis of the findings is also subjected to qualitative analytical approaches. Such approaches enhance the qualitative nature and provide rigour for the research (Brady, 2015; Fletcher & Marchildon, 2014; Fletcher & Marchildon, 2018; McPherson et al., 2018). Using an expert panel with multiple rounds of questioning in the Delphi method makes it appropriate to bring out reinforced responses that improve reliability and validity (Habibi et al., 2014). This approach is required for DT study, a new phenomenon requiring in-depth understanding. The Delphi method was selected as the optimal qualitative research method for this study because it is hailed for acquiring meaningful insight into “complex phenomena” (Brady, 2015; Iphofen & Tolich, 2018).

#### 4.2.4 Research Sampling

Purposive sampling was used to select participants for the study. Purposeful or purposive sampling is “a non-probability sampling technique used in qualitative research based on characteristics of a population and the purpose of the study” (Shaheen & Pradhan, 2019). Purposive sampling can help recruit participants from target populations that are more specific with specialised attributes (Chang et al., 2021; Shaheen & Pradhan, 2019). The participants should have the requisite knowledge, experience and understanding of the phenomenon being researched. Purposive sampling is commonly used in qualitative studies to find and choose expert participants with constrained resources (Shaheen & Pradhan, 2019; Skinner et al., 2015). “Purposive sampling resides on the proposition that information-rich samples must be selected to have an in-depth view of the phenomena” (Shaheen & Pradhan, 2019). Therefore, Purposive sampling was used in this study to select experts with knowledge, experience and an in-depth understanding of the phenomenon of DT.

*Inclusion criteria* for the selection of experts were established for the study. The selection was based on various criteria for determining experts in qualitative Delphi research. (Alarabiat & Ramos, 2019; Habibi et al., 2014; Mergel et al., 2019; Sekayi & Kennedy, 2017; Skinner et al., 2015; Wang & Reio, 2017). Literature confirms that the composition of experts may vary according to the topics covered, the nature of different viewpoints incorporated and the capability of the facilitator or researcher (Hasson et al., 2000; McPherson et al., 2018). It is also established that experts' composition and source for a Delphi may vary according to the number of available experts, the desired geographical or categorical representation, the time available, the means of communication, and the financial resources available (Hasson et al., 2000; McPherson et al., 2018).

The criteria included the *depth of knowledge and experience* in DT, *the capacity and willingness to participate in the study*, and *sufficient time to participate in the three rounds of Delphi* (Sekayi & Kennedy, 2017). The experts were *to include professionals and practitioners of DT with rich experience and expertise*. Furthermore, the experts were *to have a minimum of five years of working experience, theoretical and practical knowledge of DT, insight, and understanding of DT*. The experts were also *to have multiple specialities* since it is suggested that using a combination of individuals with multiple specialities and *heterogeneous groups* is better than using homogeneous groups (Habibi et al., 2014; Mergel et al., 2019; Skinner et al., 2015). Moreover, the experts were *to be selected from different DCs with diverse income and geographical classifications*. They were also *to be of the calibre of persons who could be reached virtually online via email and WhatsApp and respond to the questionnaire and interview online via online forms and internet calls*.

***Finding the experts and means of reach*** to the experts involved web search, personal, business and academic networks and contacts. A snowballing-like strategy was also employed where identified experts were asked to contact others they know and consider as experts in DT. For example, the initial contacts in China and India brought on other experts from the same countries. At the same time, the initial contact in Nigeria also contacted others in Kenya and South Africa. The selected experts were sent communications via e-mail, WhatsApp and phone, appreciating their intention to participate and briefing them about the study. Meanwhile, IDs were assigned to the experts, and their informed consent was sought (Kaiser, 2009).

The ***types of experts*** selected included academics, entrepreneurs, managers, and consultants. The academics consisted of lecturers and consultants in tertiary educational institutions whose teaching encompasses digital technologies, DT, and digital entrepreneurship. Meanwhile, the

entrepreneurs comprised digital entrepreneurs whose core business operations involved digital technology products and services. The managers comprised senior management personnel whose enterprises have adopted and used digital technologies to improve their operations, functions, and processes. The information technology consultants and practitioners were comprised of IT experts and specialists. They have been directly or indirectly involved in introducing and applying digital technologies to transform organisations, particularly SMEs. Meanwhile, using a combination of experts with multiple specialities is strongly recommended (Habibi et al., 2014; Mergel et al., 2019).

Meanwhile, *diverse geographical background* was considered in the selection of the experts. The experts were recruited from different developing countries, representing diverse cultural, geographical, regional, and industrial clusters in the world. The reason for using experts from different developing countries and clusters was to have a broad representation of developing countries that would offer an in-depth understanding of DT from varying cultures and levels of development. This approach was expected to make the findings much more representative. It was achievable due to the means of data collection with online forms and the effective communication with the participants (Sekayi & Kennedy, 2017).

Furthermore, McPherson et al., 2018 affirm that “communication with geographically diverse experts is easily and affordably achieved” with emerging technology. Meanwhile, a key advantage of Delphi is that, because participants can be interviewed or surveyed individually, it can facilitate dialogue and asynchronous communication with experts from diverse geographical locations while preserving anonymity (Fletcher & Marchildon, 2014; Skinner et al., 2015). The experts were selected from six developing countries, Ghana, Nigeria, Kenya,

South Africa, China, and India, representing different income and geographical regions (World Bank, 2020), discussed in Section 1.6.

The *sample size* or *panel size* of the experts was determined to be between 10 and 25 experts, since most of the literature suggests that range as appropriate for a Delphi panel size (Alarabiat & Ramos, 2019; Wang & Reio, 2017). The experts' composition and panel size for Delphi may vary according to the mode of communication and the possible number of dropouts (Hasson et al., 2000; McPherson et al., 2018). Skinner et al. (2015) assert that the sample or group size for the Delphi study does not depend on statistical power but on group dynamics necessary for arriving at a consensus among experts. For qualitative Delphi studies, some literature suggests a panel size of as low as five to ten and not less (Habibi et al., 2014), while others recommend as high as 20 to 30 and not more (Sekayi & Kennedy, 2017).

#### **4.2.5 Experts Selected for the Study**

A sample size of twenty-four (24) experts was targeted and purposively selected for this study, following the Delphi design and criteria (Alarabiat & Ramos, 2019; Wang & Reio, 2017). Eventually, twenty (20) out of the twenty-four (24) finally agreed to participate in the study. Meanwhile, sixteen (16) of them were used in the main study, whereas two (2) were used to review the questionnaire and interview guide, and the other two (2) were used to help facilitate the data analysis. The selected experts' profiles are shown in Table 4.1, and a summary of their profile attributes is shown in Table 4.2.

**Table 4.1 Profile of the Experts as Study Participants**

No.	Expert ID	Type of Expert	Position	Areas of Expertise	Country	Age (years)	Gender	Years of Experience
1	TB	Entrepreneur	CEO	POS Systems	China	20-30	Male	6
2	JA			Financial Systems	Ghana			5
3	NAB			Enterprise Systems	Nigeria	30-40	Female	17
4	OK			IS Implementation			Male	12
5	HA			IS Development	India	50-60	Male	30
6	DA	Manager	Operations Head	Telecom Systems	Ghana	30-40	Male	12
7	JG		Director of ICT			40-50		23
8	AM		IT Head	IT Management	20			
9	HL		Sales Executive	Biometric Systems	China	50-60		Female
10	MF	Consultant	IT Consultant	Security Systems	South Africa	30-40	Female	13
11	TM			Antivirus Systems			Male	18
12	PM			IS Development	India	40-50	20	
13	NW	MIS Consultant	IS Integration	Kenya	30-40	Female	15	
14	EOA	Academic	Snr Lecturer	Enterprise Systems	Ghana	50-60	Male	28
15	BDQ			IT Policy and Strategy		40-50		22
16	NYA		Lecturer	IS Development	30-40	Female	10	

**Table 4.2 Summary of the Profile Attributes of the Experts as Study Participants**

Type of Expert	Position	Areas of Expertise	Country	Age (years)	Gender	Years of Experience
Entrepreneurs: 5	IT Consultant: 3	Financial Systems 1 POS Systems 1 Security Systems 1 Biometric Systems 1	Ghana: 8 Nigeria: 1	(20-30) 2		(5-10) 3
Managers: 4	Snr Lecturer; 2	Telecom Systems 2 Antivirus systems 1 Enterprise Systems 2	S. Africa: 2	(30-40) 8	Male: 11	(11-15) 4 (16-20) 4
Consultants: 4	Lecturer; 1	IT Policy and Strategy 1 IT management 1	Kenya: 1 India: 2	(40-50) 3	Female: 5	(21-25) 2
Academics: 3	MIS Consultant: 1	IS Implementation 1 IS Development 3 IS Integration 1	China: 2	(50-60) 3		(26-30) 3

### 4.3 Data Collection

The objective of the data collection was to gather relevant information and insights from the experts on DT. This approach is to help unravel the mechanisms and structures of the DT phenomenon regarding the drivers, processes, outcomes and their relationships, and the influence of SMEs capabilities and capacities on these factors. The data was collected through a three-round Delphi method (Brady, 2015; Fletcher & Marchildon, 2014). Using the Delphi method and related research instruments was more appropriate and convenient, as it coincided with the COVID-19 pandemic, where restrictions on movements and physical contact were in place.

This study's data collection activities included the design of the instrument, preparation for data collection and the actual data collection. The data collection itself was conducted in three rounds of Delphi. The data collection activities and processes took about twenty-eight weeks (seven months) to complete. Meanwhile, Delbecq et al. (1975) confirm that Delphi studies could be time-consuming and take up to six months or more to complete due to the iterative rounds. The data collection activities for this study are summarised in Table 4.3.

**Table 4.3 Summary of Data Collection Activities**

Stage	Activity	Details	Initiation date	Period
Data Collection Instrument	Development of the primary questionnaire and interview guide for the Delphi round 1	Open-ended questions to solicit experts' unbiased opinion	02-03-2020	2 weeks
	Selection of DT Experts as Respondents	Contacting the experts, explaining the purpose of the research, and getting confirmations for participation	16-03-2020	3 weeks
	Review and Validation of questionnaire and interview guide	two experts reviewed the questionnaire and guide	13-04-2020	2 weeks
Preparation for Data Collection	Submission of the questionnaire and interview guide with other documents for ethical clearance	Ethical clearance period	11-05-2020	18 weeks

	Sharing of information with experts for briefing and their consent	Research overview, conditions, and consent	21-09-2020	2 weeks
Delphi Round 1	The questionnaire was made available through an online google form, and responses were requested for round 1	online web form link via email and WhatsApp (16)	05-10-2020	3 weeks
	Detailed Interviewing of experts after round 1 response	16 interviewed 8 via phone 8 Face to face	26-10-2020	3 weeks
	Review and analysis of round 1 responses	Details in Section 4.7	16-11-2020	4 weeks
Delphi Round 2	Development and review of round 2, questionnaire and interview guide	Close-ended questions	14-12-2020	1 week
	The questionnaire was made available with an online google form, and responses were requested for round 2	online web form link via email and WhatsApp (16)	04-01-2021	2 weeks
	Short interview of experts after round 2 questionnaire responses	16 interviewed 8 via phone 8 Face to face	18-01-2021	2 weeks
	Review and analysis of round 2, responses	Details in Section 4.7	01-02-2021	2 weeks
Delphi Round 3	Development and review of round 3, questionnaire and interview guide	Close-ended questions	15-02-2021	1 week
	The questionnaire was made available with an online google form, and responses were requested for round 3	online web form link via email and WhatsApp (16)	22-02-2021	1 week
	Brief interview of experts after round 3 questionnaire responses	16 interviewed 8 via phone 8 Face to face	01-03-2021	1 week
	Review of round 3 responses	Details in Section 4.7	08-03-2021	1 week

#### 4.3.1 Data Collection Instrument

The questionnaire and the interview guide for the Delphi first round, described as primary instruments, were developed with straightforward, basic open-ended questions for this study (Fletcher & Marchildon, 2018; Moser & Korstjens, 2018). This questionnaire was meant to solicit the expert's opinion without imposing suggestions. With exploratory qualitative Delphi studies, coupling the open-ended questionnaire with interviews brings out more qualitative responses through follow-up questioning, which helps achieve triangulation (Fletcher & Marchildon, 2018; Moser & Korstjens, 2018). Other questionnaires were developed for the Delphi rounds 2 and 3 and described as secondary and tertiary instruments. The complete

Questionnaire for the Delphi rounds 1, 2 and 3 are presented in Appendix 1, 2 and 3, while the Interview guide is in Appendix 4.

The questions asked related to the study's three research questions. However, there were also preliminary questions regarding the profile details of the experts and the digital technologies used in DT of SMEs in DCs. The two experts carefully reviewed the questionnaire and the interview guide, which resulted in some modifications. In qualitative research, expert review and validation or field testing can help increase the validity of research questions (Creswell, 2014) and help establish the research design's reliability (McDonald et al., 2019; Waheed et al., 2020). One of the reviewers is a digital entrepreneur with over eight years of experience. The other is an academic with over six years of experience teaching and consulting in digital entrepreneurship. The review focused on clarity of questions, ease of response to the questions, alignment with research questions, introductory definitions and explanations of terminologies, key concepts, and field testing of questions.

#### **4.3.2 Preparation for Data Collection**

After the review, the questionnaire, interview guide, and other documents were submitted for ethical clearance. While waiting for the ethical clearance, other information was shared with the sixteen (16) experts, including a recap of the study overview, the nature and approaches of the Delphi technique, and the prospective timetable for the three Delphi rounds. Others comprised how participants' anonymity and confidentiality would be assured and ensured. The informed consent form was also shared, and participants were made to acknowledge and agree to it (Kaiser, 2009).

Anonymous identifiers were used to identify each participant based on their initials, and all study documents containing participant information were password-protected to ensure participant privacy and confidentiality (Brady, 2015; Kaiser, 2009; McPherson et al., 2018). Anonymity characteristic supports panellist independence and provides a safety net for panellists from having to act as competitors (Kaiser, 2009). This anonymity guarantees more-objective answers and results (Skinner et a., 2015). The experts were made to decide which medium of questionnaire dissemination was convenient. This procedure was necessary to ensure that the study's participation and format were convenient for the respondents. All the experts were comfortable with filling out the forms online.

#### **4.3.3 Delphi Round 1**

The primary questionnaires were administered to the respondents through a designed Google form. The link to the Google form was sent to the participants by email and WhatsApp. After the responses were received, the experts were also interviewed with the primary interview guide, eight via telephone and eight via face-to-face, to complement the questionnaire's responses and enhance rigour by obtaining in-depth knowledge about SMEs' DT in DCs. Only the eight experts located in Ghana were interviewed face-to-face. The rest (two in China, two in India, two in South Africa, one in Nigeria and one in Kenya) were interviewed via phone.

Although very convenient, the telephone interviews could not observe non-verbal clues that could offer essential information. However, the face-to-face interview offered the most effective approach to gathering mood and non-verbal clues (Heath et al., 2018). The interviews were recorded and transcribed. The responses received from both the questionnaire and interviews were collated and analysed. The detail of the analysis is provided in Section 4.7

#### **4.3.4 Delphi Round 2**

After all the responses to the primary questionnaires and interviews were analysed, a new questionnaire and interview guide (secondary) was developed based on consolidating the first round's responses and the analysed themes related to the conceptual framework and literature. It was further reviewed and sent back to the respondents. The experts were asked to verify that their initial responses were interpreted with appropriate themes in the second-round questionnaire. They were further asked to verify and refine the factors and themes.

During the second stage, the experts were also asked to explain how some factors influence others and give reasons. The questions relating to the influences in the second round sought to respond to the second and third research objectives and questions. This stage also aimed to build a robust and consolidated consensus on the research items and expand the scope (Mergel et al., 2019). The responses reviewed focused on items or points selected by at least four (25%) experts as a basis for consensus.

#### **4.3.5 Delphi Round 3**

The Delphi round 3, the final round and described as a final member check, was conducted with the developed tertiary questionnaire and interview guide after round 2 responses were analysed. The round 3 questionnaire and the interview responses were also analysed. Meanwhile, the third round ensured the integrity, accuracy, and trustworthiness of responses to enhance the rigour of the qualitative Delphi study (Aunguroch et al., 2020; Koelsch, 2013; Koelsch, 2018). Thus, the member check helped to seek accuracy and assess change throughout the study ensuring validity and reliability (Aunguroch et al., 2020; Koelsch, 2013; Koelsch, 2018).

#### 4.4 Data Analysis

The data analysis followed a typical qualitative research approach with thematic analysis. The thematic analytical approach suits the employed philosophy of critical realism, as causal relationships and explanations are sought regarding the DT factors (Fryer, 2022). Themes were therefore established to unearth causal the DT phenomenon and possible causal explanations (Fryer, 2022). The establishment of themes was facilitated with the help of the two experts assigned to the analysis. The analysis was conducted for each of the three rounds of Delphi (Alarabiat & Ramos, 2019) since prior waves of data collection had to be analysed to inform the questionnaires developed for subsequent study waves (Brady, 2015; McPherson et al., 2018). The Delphi method may use various analytic techniques depending on the purpose of the research, the design employed, and the type of data collected (Dalkey & Helmer, 1963; Strasser, 2017). It is widely stated within the Delphi methodological literature that qualitative Delphi studies should use thematic analysis (Dalkey & Helmer, 1963; Alarabiat & Ramos, 2019).

##### 4.4.1 Analytical Process Framework

A Data Analysis Process Framework was developed to guide the analysis of the findings. The framework draws from the data analysis concepts of Bazeley (2009), Gioia et al. (2013) and Strauss (1987). The Strauss (1987) method of data analysis involving open-coding, axial-coding, and selective-coding approaches was used to help identify and refine the *concepts*, *themes*, and *categories* (Vollstedt & Rezat, 2019). For a thematic analysis, Strauss and Corbin (1998) view rigorous qualitative data analysis to identify concepts and categories. It also involves the movement from specific ideas to less specific but more explanatory ideas found in themes of participant responses (Vaismoradi & Snelgrove, 2019).

To explain the coding, Strauss and Corbin (1995) define the related terms: *Phenomena* as the central ideas in the data represented as concepts; *concepts* as the building blocks of theory; *categories* as concepts that stand for phenomena; and *dimensions* as the range along which general properties of a category vary giving specification to a category and variation to the theory (p. 101). *Open coding* is “the analytic process through which concepts are identified, and their properties and dimensions are discovered in data” (Strauss & Corbin, 1998, p. 101). *Axial coding* is “the process of relating categories to their subcategories, termed “axial” because coding occurs around the axis of a category, linking categories at the level of properties and dimensions” (Strauss & Corbin, 1998, p. 123). *Selective coding* is “the process of integrating and refining the theory” (Strauss & Corbin, 1998, p. 143). The core codes guide further theoretical sampling and data collection (Strauss, 1987).

The Gioia et al. (2013) method of data analysis, which allows iteration between data and theories through three main steps, was also adopted to supplement the analysis framework. The steps involve *first-order analysis* where many informant-centric terms and codes emerge and are used (similar to Strauss and Corbin’s (1998) notion of Open coding). This analysis results in first-order codes, which Gioia et al. (2013) describe as first-order *terms* or concepts. Then there is a *second-order analysis*, where researcher-centric and theory-centric concepts and themes are used. Similarities and differences among the many categories are sought, and themes are generated with theoretical sampling (akin to Strauss and Corbin’s (1998) Axial coding).

This analysis results in the second-order codes, which Gioia et al. (2013) describe as second-order *themes*. Finally, there is *third-order analysis* (Gioia, 2021), where significant categories are determined while relating to existing theories and concepts (analogous to Strauss and

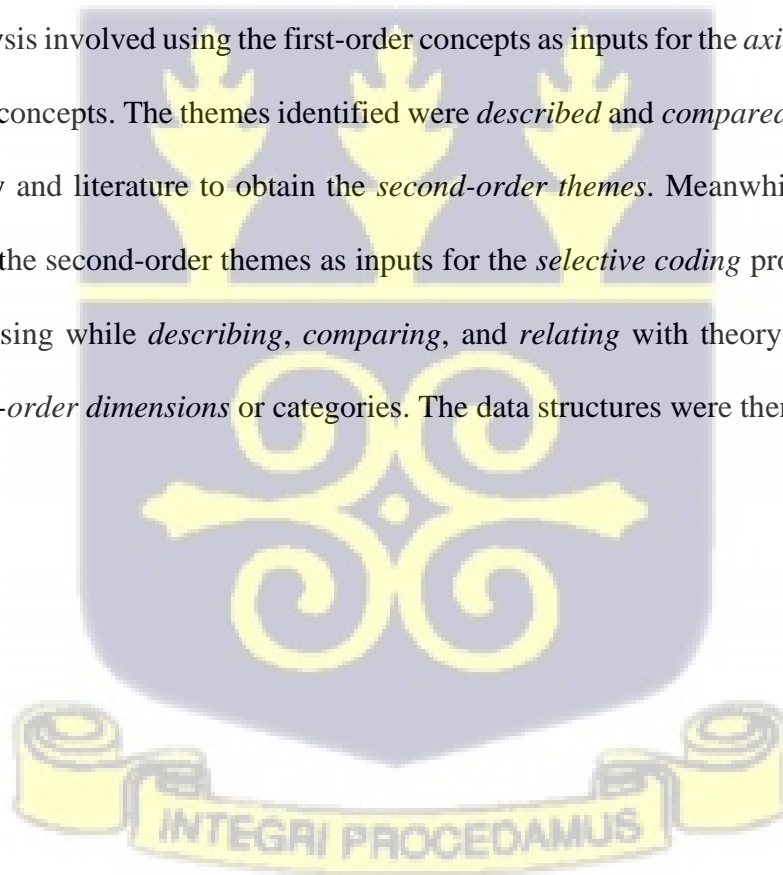
Corbin's (1998) Selective coding). This coding results in third-order codes also described as overarching or aggregate *dimensions* (Gioia et al., 2013; Gioia, 2021). Gioia et al. (2013) also emphasise the need to prepare data structure showing the first, second, and third-order codes as terms, themes, and dimensions and how they relate.

Bazeley's (2009) three-step analysis approach of 'describe,' 'compare,' and 'relate' was also implied to complement the analysis framework. The approach describes, compares, and relates the identified concepts, themes, and categories (Bazeley, 2009). '*Describe*' outlines the study's context and provides details about data sources, such as the demographic features of the sample and the interrelationships between these features ('describe' applies to the first-order concepts of Gioia et al., (2013)). '*Compare*' reveals the differences in the characteristics and boundaries for just that theme or category across contrasting demographic groups or variations in context. 'compare' relates to the second-order themes and third-order aggregate dimensions of Gioia et al. (2013)). '*Relate*' helps link identified categories or themes to others already written about, such as theories, models, frameworks, and extant literature ('relate' applies to the third-order aggregate dimensions of Gioia et al. (2013)).

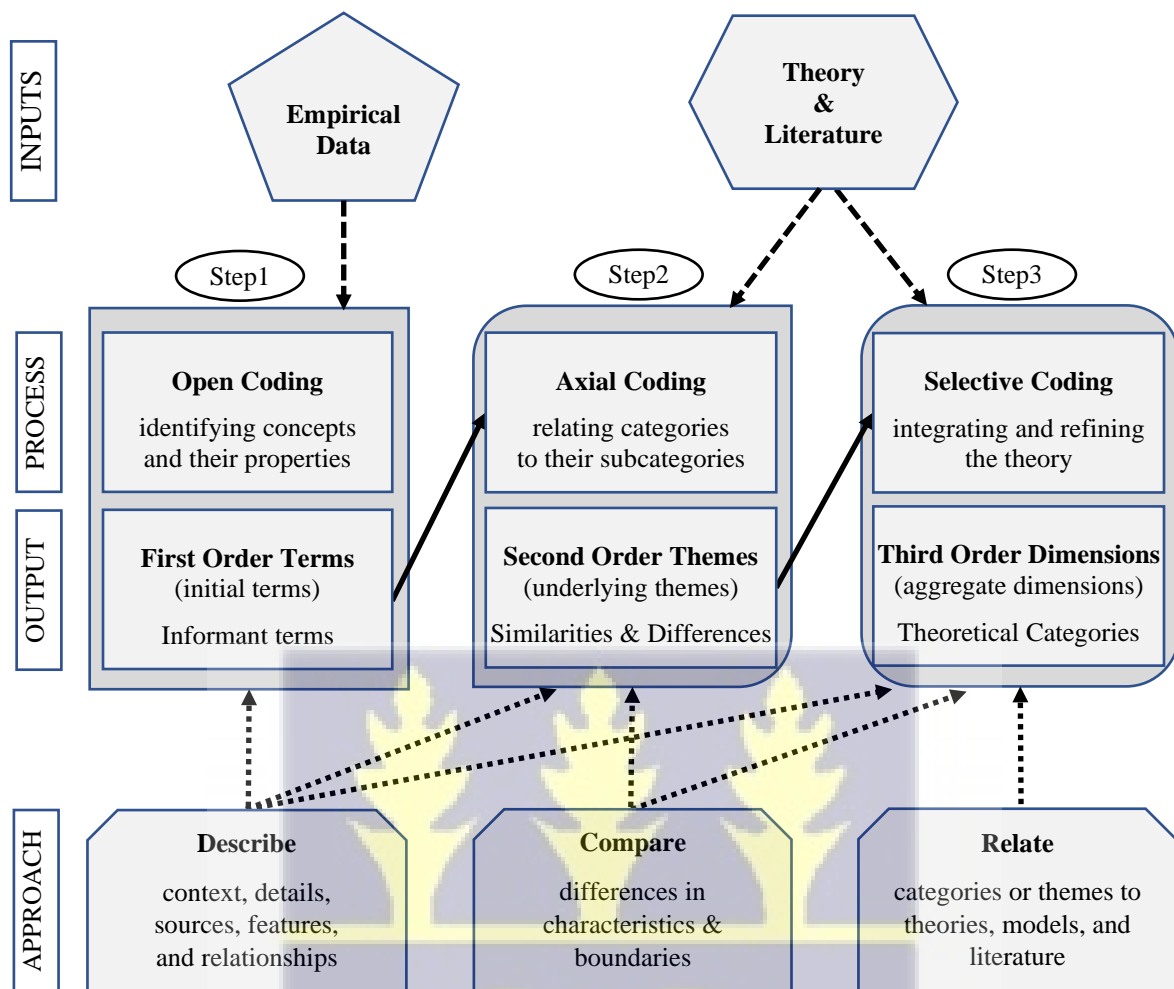
The data analysis concepts from Bazeley (2009), Gioia et al. (2013) and Strauss (1987), therefore, related to one another and were easily integrated to form the data analysis process framework that guided the data analysis of this study. The Strauss (1987) and Strauss and Corbin (1998) coding paradigm of open, axial, and selective coding into concepts and categories, the Gioia et al. (2013) analysis outputs of first-order terms, second-order themes, and third-order dimensions and Bazeley (2009) approach of describe, compare, and relate, were integrated.

In this integrated analysis framework, open coding, axial coding, and selective coding are seen as *processes* in the analysis. The first-order terms, second-order themes and third-order dimensions are considered *outputs* from the processes. Moreover, describing, comparing, and relating are deemed further analysis approaches. Meanwhile, the empirical data becomes the input for the first step, and the theories and literature become the input for the second and third steps. The integrated data analysis process framework is illustrated in Figure 4.1.

For this study, based on the data analysis framework developed (Figure 4.1), the *first step* of the analysis involved using the empirical data as the input for the *open coding* process using informant-centric concepts while *describing* the data to obtain the *first-order terms*. The *second step* of the analysis involved using the first-order concepts as inputs for the *axial coding* process of categorising concepts. The themes identified were *described* and *compared* with themselves and with theory and literature to obtain the *second-order themes*. Meanwhile, the *third step* involved using the second-order themes as inputs for the *selective coding* process. It involved further categorising while *describing, comparing, and relating* with theory and literature to obtain the *third-order dimensions* or categories. The data structures were then prepared.



**Figure 4.1 Data Analysis Process Framework (Researcher's framework)**



*Note.* Source: Researcher's Design, based on Bazeley (2009), Gioia et al. (2013), and Strauss (1987)

#### 4.4.2 Analysis of Preliminary Responses on Digital Technologies used in DT

This study's data analysis aimed to answer the research questions. However, the questionnaire had preliminary questions about the digital technologies used for the DT of SMEs in DCs, which also needed to be analysed. The analysis used the data analysis process framework and followed the analytical steps presented in Section 4.7.1.

For the Delphi round 1, 36 first-order terms (Gioia et al., 2013) were determined in the first step. These terms were considered inputs for the second step and yielded 24 second-order themes (Gioia et al., 2013). The themes used as inputs for the third step resulted in 14 aggregate dimensions (Gioia et al., 2013) that match existing literature and are referred to as third-order dimensions. The Delphi round 2 reviews and analysis resulted in 32 terms, 23 themes and 12 dimensions of digital technologies at the first, second, and third steps, respectively. The Delphi round 3 responses, review and analysis further confirmed the outcomes of round 2. The outcomes of these analyses are presented as the findings in Section 5.2.

#### **4.4.3 Analysis of Research Question 1, Responses on DT Factors**

Research question 1 aimed to determine the drivers, processes, and outcomes of DT of SMEs in DCs. The data analysis process framework and the analytical steps developed in Section 4.7.1 was used to analyse the responses to the three rounds of Delphi relating to DT's drivers, processes, and outcomes.

For Delphi round 1, the first step of open coding yielded 34 terms of drivers, 17 terms of processes and 24 terms of outcomes. These concepts were then subjected to the second step of axial coding, which resulted in 18 themes of drivers, 11 themes of processes and 12 themes of outcomes. As inputs for the third step of selective coding, the analysis ensued with six dimensions of drivers, five dimensions of processes and six dimensions of outcomes. Meanwhile, the Delphi round 2 analysis akin to round 1 resulted in 32, 17 and 24 terms of drivers, processes, and outcomes, respectively, at the first step. The second step resulted in 15, 11 and 12 themes of drivers, processes, and outcomes, respectively, while the third step resulted in six, five and six dimensions of drivers, processes, and outcomes, respectively. These same

themes and dimensions were confirmed without modification at the Delphi round 3 and presented in Section 5.3.

#### **4.4.4 Analysis of Research Question 2 Responses on DT Factors Relationships**

Research question 2 aimed to determine the relationships and influences among DT's drivers, processes, and outcomes of SMEs in DCs. The data analysis process framework and steps developed in Section 4.7.1 were used to analyse the responses to the Delphi round 1, 2, and 3, relating to the relationships and influences among the drivers, processes, and outcomes of DT.

For Delphi round 1, the first step of the analysis gave 32 influences of drivers on processes, 30 influences of drivers on outcomes, 21 influences of processes on outcomes and 35 influences of outcomes on drivers. The second step resulted in the second-order themes of 24 influences of drivers on processes, 18 influences of drivers on outcomes, 19 influences of processes on outcomes and 26 influences of outcomes on drivers. After the third step, the third-order dimensions comprised 15 influences of drivers on processes, 18 influences of drivers on outcomes, 14 influences of processes on outcomes and 15 influences of outcomes on drivers.

The Delphi round 2 resulted in first-order terms of 34 influences of drivers on processes, 32 influences of drivers on outcomes, 23 influences of processes on outcomes and 39 influences of outcomes on drivers. Second-order themes involved 22 influences of drivers on processes, 25 influences of drivers on outcomes, 20 influences of processes on outcomes and 24 influences of outcomes on drivers. In contrast, the third-order dimensions comprised 15 influences of drivers on processes, 19 influences of drivers on outcomes, 15 influences of processes on outcomes and 15 influences of outcomes on drivers. Meanwhile, Delphi round 3 confirmed the

same influences on the drivers, processes and outcomes. The details of the Delphi round 3 findings are shown in Section 5.4.

#### **4.4.5 Analysis of Research Question 3 Responses on Influence of SMEs Abilities**

Research question 3 aimed to determine the influences of the SMEs capability and capacity on the drivers, processes, and outcomes of DT of SMEs in DCs. The data analysis process framework and the steps developed in Section 4.7.1 were used to analyse the responses to the Delphi round 1, 2 and 3, relating to the influences of the SMEs' capability and capacity on the DT drivers, processes, and outcomes. Meanwhile, the SMEs' capabilities and capacities were determined and analysed before examining the influencing effect.

For Delphi round 1, the first step of the analysis yielded first-order terms of 28 SMEs capabilities and capacities and their 30 influences on drivers, 38 influences on processes and 30 influences on outcomes. The second step resulted in the second-order themes of 12 SMEs capabilities and capacities and their 25 influences on drivers, 28 influences on processes and 25 influences on outcomes. After the third step, the third-order dimensions of 4 SMEs capabilities and capacities and their 14 influences on drivers, 24 influences on processes and 16 influences on outcomes were also identified.

The Delphi round 2 revealed first-order terms of 26 SMEs capabilities and capacities and 29 influences on drivers, 37 influences on processes, and 29 influences on outcomes. Then in the second step, there were second-order themes of 11 SMEs capabilities and capacities and their 24 influences on drivers, 27 influences on processes, and 24 influences on outcomes. Moreover, in the third step, there were third-order dimensions of 4 SMEs capabilities and capacities and 13 influences on drivers, 23 influences on processes, and 16 influences on outcomes. These

were subjected to Delphi round 3, where they were all confirmed. The findings are shown in Section 5.5.

#### **4.5 Ethical Considerations**

During the research planning, conducting, and reporting, this study was guided by some ethical principles to ensure proper ethical considerations. The study, therefore, adopted Walsham's (2006) specific confidentiality and anonymity domains in working with the participating DT experts. Protecting the rights and privileges of participants is also essential in ensuring proper ethical research. Researchers are expected to protect their study participants from influence and harm while safeguarding their confidentiality by obtaining their informed consent to participate in a study (Yin, 2014).

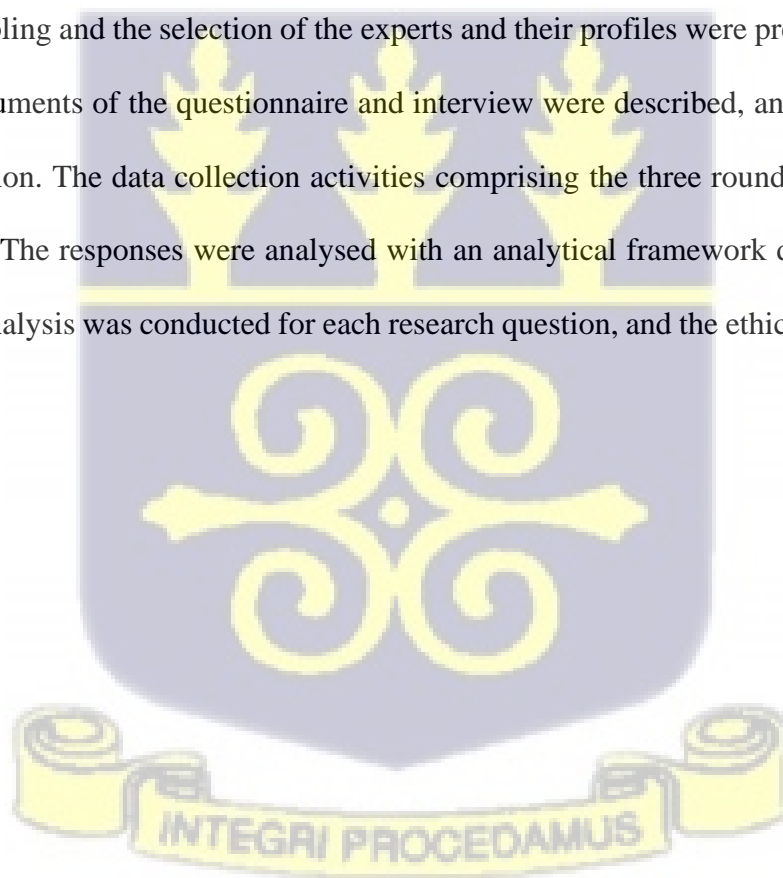
Considering this, participants of this study had to confirm their willingness to participate by giving their consent before responding to the questionnaire and interview. Again, participants were briefed on the purpose and substance of the research (Walsham, 2006). Participants also had the opportunity to ask any questions concerning the study requirements and were not, at any point, forced to participate in the study, as participation was entirely voluntary (Yin, 2014). No coercive measures were used on participants, and respondents' anonymity was assured. Therefore, participants had the right to withdraw from the study without explanation. In addition, participants did not receive monetary or any other incentives for participating in this research.

Participants' periods were convenient for the interview sessions to ensure unbiased responses and a relaxed atmosphere. On the researcher's part, any information that was deemed

confidential by participants was treated as such. The researcher ensured that anything reported in this study was duly acknowledged to avoid plagiarism. Study participants' views, observations and individual experiences formed the basis for interpreting this study's findings (Marshall & Rossman, 2016). Furthermore, the researcher was guided by Mingers' (2009) perspectives on the CR paradigm's moral realism and ethical naturalism.

#### **4.6 Chapter Summary**

The research strategy used, comprising the study's philosophy of CR, the exploratory qualitative approach, and the Delphi methodology design, was presented. The criteria for the Purposive sampling and the selection of the experts and their profiles were presented. The data collection instruments of the questionnaire and interview were described, and the preparation for data collection. The data collection activities comprising the three rounds of Delphi were also described. The responses were analysed with an analytical framework developed for the purpose. The analysis was conducted for each research question, and the ethical considerations were discussed.



## CHAPTER FIVE





















### 5 RESEARCH FINDINGS

#### 5.1 Chapter Overview

This chapter presents the study's findings after the analysis involving the three rounds of the Delphi studies and based on the preliminary inquiries and research questions. The findings are presented in four sections. The first section presents the findings relating to the digital technologies used in the DT of SMEs in DCS. The second section presents the findings of the first research question about what constitutes the drivers, processes, and outcomes of DT of SMEs in DCs. The third section introduces the findings regarding the second research question on how the drivers, processes and outcomes relate to and influence one another in the DT of SMEs in DCs. The fourth section presents the findings regarding the third research question on how the SMEs capabilities and capacities influence the DT drivers, processes, and outcomes.

The legend of colour codes used in the tables of this chapter to represent the different factors and typologies is shown in Table 5.1

**Table 5.1 Legend of Colour Codes in Tables of Chapter 5**

Colour	Shades of Colours				Typologies Represented
<i>Greyish</i>					<b>Digital Technologies</b>
<i>Reddish</i>					<b>Drivers of DT</b>
<i>Yellowish</i>					<b>Processes of DT</b>
<i>Greenish</i>					<b>Outcomes of DT</b>
<i>Blueish</i>					<b>Capabilities and Capacities of SMEs</b>

## 5.2 Digital Technologies Deployed in the DT of SMEs in DCs

Regarding the findings relating to the digital technologies usually deployed in the DT of SMEs in DCs, the analysis of the responses from the three rounds of Delphi revealed the following: 32 first-order terms, 23 second-order themes and 12 third-order aggregate dimensions of digital technologies. The related terms, themes, and dimensions are presented in Table 5.2. the table also shows the number and percentages of experts that confirmed the variables.

**Table 5.2 Typologies of Digital Technologies Used in DT**

<u>1<sup>st</sup> Order Terms</u>	<u>2<sup>nd</sup> Order Themes</u>	<u>3<sup>rd</sup> Order Dimensions</u>	<u>No of Experts (Percentage)</u>	
<i>Mobile Apps,</i>	Mobile Software	<b>Mobile Computing</b>	16 (100.00%)	High
<i>Smartphones, Tablets,</i>	Mobile Devices			
<i>Desktop-Based Enterprise Systems (ERP, CRM, MRP)</i>	Desktop Applications	<b>Desktop Computing</b>	15 (93.75%)	
<i>Laptops, Desktops, Servers,</i>	Desktop Devices			
<i>Online Enterprise Systems (E.G., Ecount ERP),</i>	Cloud Software	<b>Cloud Computing</b>	15 (93.75%)	Medium
<i>Online Office Systems (E.G., Microsoft 365)</i>	Cloud Platform			
<i>Online Software Development Tools</i>				
<i>Online Operating Systems</i>				
<i>Online Data Storage Systems (E.G., Google Drive)</i>	Cloud Infrastructure			
<i>Cloud Compute, Servers, and Networks</i>				
<i>Facebook, Twitter, LinkedIn</i>	Social Interaction Networks	<b>Social Media Platforms and Networks</b>	12 (75.00%)	
<i>Youtube, Instagram, Snapchat</i>	Media Sharing Networks			
<i>Tonaton, Jumia, Olx, Ebay, Amazon</i>	Public Websites	<b>E-Commerce Platforms and Websites</b>	12 (75.00%)	
<i>Business Websites,</i>	Private Websites			
<i>Online Stores</i>				
<i>Zoom, Microsoft Teams, Google Meet</i>	Virtual Meeting Systems	<b>Virtual and Remote Communication Systems</b>	10 (62.50%)	
<i>Anydesk, Teamviewer, Ultraviewer</i>	Remote Support Systems			
<i>Skype, Whatsapp, Telegram</i>	Text/Voice/Video Chats			
<i>Performance Analysis Systems</i>	Diagnostic / Descriptive	<b>Big Data Analytics</b>	6 (37.50%)	Low
<i>Cyber Security and Threats Analysis Systems</i>	Prescriptive/Predictive			
<i>Forecasting and Predicting Systems</i>				
<i>Warehousing Robots,</i>	Robotics and Automation	<b>Robotics and Drones</b>	4 (25.00%)	
<i>Shop Dispensing Automation</i>				
<i>Drones For Delivery/Surveillance / Video</i>	Drones			

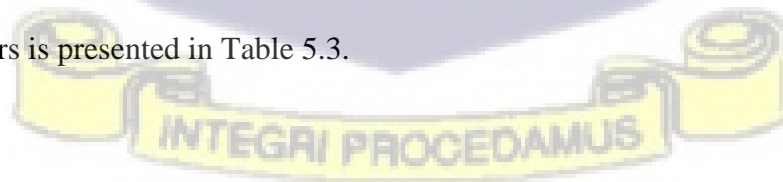
<i>Intelligent Equipment Control, Smart Wearables</i>	Internet of Things (IoT)	<b>Internet of Things (IoT)</b>	2 (12.50%)	Very low
<i>Intelligent Access Controls, Security Systems</i>				
<i>Virtual Assistants: MS Cortana, Apple Siri, Google Assist Assistant</i>	Interactive AI	<b>Artificial Intelligence (AI)</b>	2 (12.50%)	
<i>3D Printing</i>	3D Printing, Design and Manufacture	<b>Design and Manufacture Systems</b>	1 (6.25%)	
<i>Computer-Aided Design (CAM)</i>				
<i>Computer-Aided Manufacture (CAM)</i>				
<i>Bitcoin</i>	Crypto Assets	<b>Blockchain</b>	1 (6.25%)	
<i>Crypto Assets Management</i>				

### 5.3 Drivers, Processes, and Outcomes of the DT of SMEs in DCs

The findings relating to identifying the drivers, processes and outcomes of DT of SMEs in DCs, respond to the first research question and objective. The analysis of the responses from the experts in the three rounds of Delphi reveals the drivers, processes, and outcomes of SMEs' DT in DCs. Different terms, themes and dimensions of each factor are identified in the first, second and third-order analysis. These findings from the analysis are presented separately for the drivers, processes, and outcomes in the following subsections:

#### 5.3.1 Drivers of the DT of SMEs in DCs

Regarding the Drivers, analysed responses from the three rounds of Delphi showed 32 first-order terms, 15 second-order themes and six third-order categories or aggregate dimensions of drivers per the conceptual framework. The data structure of the terms, themes and dimensions of the DT drivers is presented in Table 5.3.



**Table 5.3 Typologies of Drivers of DT of SMEs**

<b>1<sup>st</sup> Order Terms</b>	<b>2<sup>nd</sup> Order Themes</b>	<b>3<sup>rd</sup> order Dimensions</b>
<i>Updatability, Upgradability and Integrability of Digital Technologies</i>	Dynamic Features	<b>Technological Features</b>
<i>New and Rapid Trends, Types, and Approaches to Digital Technologies</i>		
<i>Customisability, Adaptability, and Flexibility of Digital Technologies</i>		
<i>Comprehensiveness and Completeness of Digital Technologies</i>	Steady Features	
<i>Availability, Accessibility, and Reliability of Digital Technologies</i>		
<i>Ease of Use and Convenience of Digital Technologies</i>		
<i>Efficiency and Effectiveness of Digital Technologies</i>	Spirit Features	
<i>Timeliness and Accuracy of Digital Technologies</i>	Competition	<b>External Environment</b>
<i>Competition and Survival</i>	Partnerships (Customer and Stakeholder)	
<i>Customer Demand and Satisfaction</i>		
<i>Stakeholder Demand and Satisfaction</i>	<i>External Controls (Regulation, Pandemic)</i>	
<i>Industry, Regulation, and Government Requirements and Demands</i>	Management Abilities	<b>Internal System</b>
<i>COVID-19 Social Distancing, Lockdown and Other Restrictions</i>		
<i>Leadership Style, Interest, and Drive of Management.</i>	Organisational Resources	
<i>Knowledge and Experience of Leaders and Employees</i>		
<i>Resources, Size, Capacity, and Capabilities of the Organisation</i>	Image and Values	
<i>Beliefs, Values, Mission, and Vision of the Organisation</i>	Task Contents	<b>Work Tasks</b>
<i>Brand, Image, and Reputation of the Organisation</i>		
<i>Task Content and Nature</i>		
<i>Task Constraints and Facilitators</i>		
<i>Task Accomplishment</i>	Task Outputs	
<i>Task Outputs</i>		
<i>Increase Productivity and Performance</i>	Value and Cost-Related Change	<b>Emergent Outputs</b>
<i>Reduce, Optimise, and Contain Costs.</i>		
<i>Change Business Model and Create Value</i>		
<i>Change In the Decision Processes</i>	Organisation Related Change	
<i>Change In Organisational Structures</i>		
<i>Change In Work Patterns, Work Attitude, and Culture</i>	Task-Related Change	
<i>Processes Improvements</i>		
<i>Introduction of New Rules and Policies For the Operation</i>	New Rules	<b>New Rules and Resources</b>
<i>New Modes and Ways of Working (Working From Home)</i>		
<i>Introduction of Novel Resources, Devices, and Tools</i>	New Resources	

### 5.3.2 Processes of the DT of SMEs in DCs

The responses from the three rounds of Delphi depicted 17 first-order terms, 11 second-order themes and five third-order aggregate dimensions of processes in agreement with the conceptual framework. The data structure of the terms, themes and dimensions is presented in Table 5.4.

**Table 5.4 Typologies of Processes of DT**

1st Order Terms	2 <sup>nd</sup> Order Themes	3 <sup>rd</sup> Order Dimensions
<i>Need Analysis/Assessment, Problem Identification, and Business Case.</i>	Decision Initiation	<b>Decision-Making and Adoption</b>
<i>Industry Scan, Benchmarking, Requirement Gathering.,</i>		
<i>System Identification and Adoption</i>	Decision Completion	
<i>Procurement/Acquisition, Design, Development, Outsourcing</i>	Preparation	<b>Implementation and Use</b>
<i>Awareness Creation, Stakeholder Engagement, Change Management</i>	Implementation	
<i>Deployment, Implementation, Installation, and Configuration</i>		
<i>Training, Orientation</i>		
<i>Piloting and Testing</i>	Operation	
<i>Use and Maintenance</i>	Operational Change	<b>Changes in Function and Resources</b>
<i>Changes to Functions, Processes, Operations</i>	Structural Changes	
<i>Changes to Resources and Structures</i>	Adjustments	<b>Adjustment and Adaptation</b>
<i>Skills and Resource Alignment</i>		
<i>Customer and Competitor Response</i>		
<i>Digitalisation and Technological Adaptation</i>	Adaptations	<b>Strategic Shifts and Positioning</b>
<i>Strategic Positioning and Consolidation</i>	Positioning	
<i>Strategic Shifts and Moves</i>	Shifts	
<i>Business Model Changes and Development</i>		

### 5.3.3 Outcomes of the DT of SMEs in DCs

The responses from the three rounds of Delphi showed 24 first-order terms, 12 second-order themes and six third-order aggregate dimensions of outcomes in agreement with the conceptual framework. The data structure of the terms, themes and dimensions is presented in Table 5.5.

**Table 5.5 Typologies of Outcomes of DT**

<b>1<sup>st</sup> Order Terms</b>	<b>2<sup>nd</sup> Order Themes</b>	<b>3<sup>rd</sup> Order Dimensions</b>	<b>Nature of Outcomes</b>	<b>Decision Output Type</b>
<i>Enhancement of Business Image</i>	Image Enhancement	<b>Business Image and Value</b>	<i>Positive</i>	Effectiveness
<i>Business Differentiation and Competitive Advantage</i>			<i>Positive</i>	Effectiveness
<i>Enhancement of Product and Service Values</i>	Value Enhancement		<i>Positive</i>	Service Quality
<i>Enhanced Work Patterns, Work Attitude, and Culture</i>	Process Outcomes	<b>Work Processes and Functions</b>	<i>Positive</i>	Consensus
<i>Task Performance and Innovation</i>			<i>Positive</i>	Consensus
<i>Ease of Working and Management</i>			<i>Positive</i>	Efficiency
<i>Timeliness and Time-Saving</i>	Function Outcomes		<i>Positive</i>	System Quality
<i>Awareness/Recall/Learning</i>			<i>Positive</i>	Information Quality
<i>Decision Effectiveness and Usefulness</i>			<i>Positive</i>	Effectiveness
<i>Enhanced Resources</i>			Resources	<b>Resources and Abilities Improvements</b>
<i>Facilitate Knowledge and Skill Development</i>	Abilities	<i>Positive</i>	Commitment	
<i>Stakeholder Satisfaction and Confidence</i>	Stakeholder Satisfaction	<b>Customer and Stakeholder Satisfaction</b>	<i>Positive</i>	Service Quality
<i>Improvement In Customer Satisfaction and Customer Retention</i>	Customer Satisfaction		<i>Positive</i>	Service Quality
<i>Increase In Productivity and Efficiency</i>	Productivity	<b>Productivity and Profitability</b>	<i>Positive</i>	Efficiency
<i>Job Simplification, Performance and Effectiveness</i>			<i>Positive</i>	Effectiveness
<i>Cost Savings and Losses Reduction</i>	Profitability		<i>Positive</i>	Efficiency
<i>Increase In Profitability and Return On Investment (ROI)</i>			<i>Positive</i>	Effectiveness
<i>Improvement In Market Share and Business Growth</i>		<i>Positive</i>	Effectiveness	
<i>High Implementation and Maintenance Costs</i>	Additional Cost Burdens	<b>Undesirable Consequences</b>	<i>Negative</i>	Efficiency
<i>Loss of Job and Employment</i>	Resource and Skill Obsolescence and Loss		<i>Negative</i>	Efficiency
<i>Redundancy of Skills and Resources</i>	Security and Risk Issues		<i>Negative</i>	Efficiency
<i>Challenges With Security and Privacy</i>			<i>Negative</i>	Information Quality
<i>Misuse and Misappropriation of Technology</i>			<i>Negative</i>	System Quality
<i>Risks, Hazards, Health, and Safety Challenges</i>			<i>Negative</i>	Service Quality

## 5.4 Relationships among Drivers, Processes, and Outcomes of SMEs DT in DCs

The experts revealed significant relationships and influences among the drivers, the processes, and the outcomes of DT of SMEs in DCs. These findings respond to the second research question to understand how the drivers, processes, and outcomes influence one another in the DT of SMEs in DCs. The details of the observed influences regarding drivers on processes, drivers on outcomes, processes on outcomes and outcomes on drivers are given in the subsections below.

### 5.4.1 Influence of Drivers on Processes of DT of SMEs in DCs

Analysed responses from the three rounds of Delphi showed 34 first-order terms, 22 second-order themes, and 15 third-order dimensions of drivers influence on processes. The data structure of the terms, themes and dimensions of the DT drivers influence on processes is presented in Table 5.6.

**Table 5.6** *Typologies of Influence of Drivers on the Processes of DT*

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3rd Order Dimensions		
Influencing Drivers	Influenced Processes	Influencing Drivers	Influenced Processes	Influencing Drivers	Influenced Processes	
<i>The Updatability and Accessibility of Digital Technologies</i>	<i>Skills and Resource Alignment</i>	Dynamic Features	Adjustments	Technological Features	Adjustment and Adaptation	
<i>The Ease of Use, Flexibility, and Convenience of Digital Technologies</i>	<i>Training, Orientation</i>	Steady Features	Implementation		Technological Features	Implementation and Use
	<i>Deployment, Implementation, Installation, and Configuration</i>					
<i>New and Rapid Trends, Ways, and Approaches to Digital Technologies</i>	<i>System Identification and Adoption</i>	Dynamic Features	Decision Completion	Technological Features		Decision-Making and Adoption

<i>Comprehensiveness and Integrative Nature of Digital Technologies</i>	<i>Training, Orientation</i>	Steady Features	Implementation		<b>Implementation and Use</b>
	<i>Deployment, Implementation, Installation, and Configuration</i>				
<i>Availability and Accessibility of Digital Technologies</i>	<i>System Identification and Adoption</i>	Dynamic Features	Decision Completion		<b>Decision-Making and Adoption</b>
<i>Customisability and Adaptability of Digital Technologies</i>					
<i>Efficiency and Effectiveness of Digital Technologies</i>	<i>Use and Maintenance</i>	Spirit Features	Operation		<b>Implementation and Use</b>
<i>Timeliness and Accuracy of Digital Technologies</i>					
<i>Competition and Survival</i>	<i>Customer and Competitor Response</i>	Competition	Adjustments		<b>Adjustment and Adaptation</b>
<i>Customer Demand and Satisfaction</i>					
<i>Stakeholder Demands and Satisfaction</i>	<i>Awareness Creation, Stakeholder Engagement, Change Management</i>	Partnerships	Preparation	<b>External Environment</b>	<b>Decision-Making and Adoption</b>
<i>Industry, Regulation, and Government Requirements and Demands</i>	<i>System Identification and Adoption</i>	External Control	Decision Completion		
<i>Covid-19 Social Distancing, Lockdown and Other Restrictions</i>	<i>Changes to Function Processes, Operations</i>		Operational Change	Structural Changes	
	<i>Changes to Resources and Structures</i>				
<i>Leadership Style, Interest, and Drive of Management.</i>	<i>Procurement/Acquisition, Design, Development, Outsourcing.</i>	Management Abilities	Decision Completion	<b>Internal System</b>	<b>Decision-Making and Adoption</b>
	<i>System Identification and Adoption</i>				
<i>Resources, Size, Capacity, and</i>	<i>Skills and Resource Alignment</i>	Organisational Resources	Adjustments		<b>Adjustment and Adaptation</b>

<i>Capabilities of the Organisation</i>	<i>Changes to Resources and Structures</i>		Structural Changes		<b>Changes In Function and Resources</b>
<i>Beliefs, Values, Mission, and Vision of the Organisation</i>	<i>Business Model Changes and Development</i>	Image and Values	Shifts		<b>Strategic Shifts and Positioning</b>
	<i>Strategic Shifts and Positioning</i>				
<i>Knowledge and Experience of Leaders and Employees</i>	<i>System Identification and Adoption</i>	Management Abilities	Decision Completion		<b>Decision-Making and Adoption</b>
<i>Task Accomplishment</i>	<i>Changes to Functions, Processes, Operations</i>	Task Outputs	Operational Change	<b>Work Tasks</b>	<b>Changes In Function and Resources</b>
<i>Task Outputs</i>		Task Contents			
<i>Task Content and Nature</i>					
<i>Task Constraints and Facilitators</i>					
<i>Increase In Productivity and Performance</i>	<i>Business Model Changes and Development</i>	Value and Cost-Related Change	Shifts	<b>Emergent Outputs</b>	<b>Strategic Shifts and Positioning</b>
<i>Reducing, Optimising, and Containing Costs.</i>					
<i>Change the Business Model and Create Value</i>					
<i>Change In Work Patterns, Work Attitude, and Culture</i>	<i>Changes to Functions, Processes, Operations</i>	Task-Related Change	Operational Change	<b>Emergent Outputs</b>	<b>Changes In Function and Resources</b>
<i>Process Improvements</i>					
<i>Change In the Decision and Organisational Structures</i>	<i>Changes to Resources and Structures</i>	Organisation Related Change	Structural Changes	<b>New Rules and Resources</b>	<b>Changes In Function and Resources</b>
<i>Introduction of Novel Resources</i>	<i>Changes to Resources and Structures</i>	New Resources	Operational Change		
<i>Introduction of New Rules For Operation</i>	<i>Changes to Functions, Processes, Operations</i>	New Rules			
<i>New Modes and Ways of Working</i>	<i>Changes to Functions, Processes, Operations</i>				



#### 5.4.2 Influence of Drivers on Outcomes of DT of SMEs in DCs

Analysed responses from the three rounds of Delphi showed 32 first-order terms, 25 second-order themes and 19 third-order dimensions of influences of drivers on outcomes of DT of

SMEs in DCs. The data structure of the terms, themes and dimensions of the DT drivers' influence on outcomes is presented in Table 5.7.

**Table 5.7 Typologies of Influence of Drivers on the Outcomes of DT**

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3 <sup>rd</sup> Order Dimensions		
Influencing Drivers	Influenced Outcomes	Influencing Drivers	Influenced Outcomes	Influencing Drivers	Influenced Outcomes	
<i>Updatability and Accessibility of Digital Technologies</i>	<i>Ease of Working and Management</i>	Dynamic Features	Process Outcomes	Technological Features	Work Processes and Function	
<i>Ease of Use, Flexibility, and Convenience of Digital Technologies</i>	<i>Ease of Working and Management</i>	Steady Features	Function Outcomes			
	<i>Timeliness and Time-Saving</i>					
	<i>Task Performance and Innovation</i>					
<i>Comprehensiveness and Integrative Nature of Digital Technologies</i>	<i>Ease of Working and Management</i>	Dynamic Features	Process Outcomes			
<i>Customisability and Adaptability of Digital Technologies</i>	<i>Task Performance and Innovation</i>		Image Enhancement			
<i>New and Rapid Trends, Ways, and Approaches to Digital Technologies</i>	<i>Business Differentiation and Competitive Advantage</i>	Steady Features	Productivity			Productivity and Profitability
<i>Availability and Accessibility of Digital Technologies</i>	<i>Job Simplification, Performance and Effectiveness</i>	Spirit Features				
<i>Efficiency and Effectiveness of Digital Technologies</i>	<i>Increase In Productivity and Efficiency</i>	Competition	Image Enhancement			Business Image and Value
<i>Timeliness and Accuracy of Digital Technologies</i>	<i>Business Differentiation and Competitive Advantage</i>					
<i>Competition and Survival</i>	<i>Business Differentiation and Competitive Advantage</i>	Partnerships	Profitability	External Environment	Customer and Stakeholder Satisfaction	
<i>Customer Demand and Satisfaction</i>	<i>Improvement In Market Share and Business Growth</i>		Customer Satisfaction			
	<i>Improvement In Customer Satisfaction and Customer Retention</i>					

<i>Stakeholder Demands and Satisfaction</i>	<i>Improvement In Stakeholder Satisfaction and Confidence</i>		Stakeholder Satisfaction		
<i>Industry, Regulation, and Government Requirements and Demands</i>	<i>Risks, Hazards, Health, and Safety Challenges</i>	External Control	Security and Risk		<b>Undesirable Consequences</b>
<i>Covid-19 Social Distancing, Lockdown and Other Restrictions</i>	<i>Task Performance and Innovation</i>		Process Outcomes		<b>Work Processes and Functions</b>
<i>Leadership Style, Interest, and Drive of Management.</i>	<i>Enhanced Work Patterns, Work Attitude, and Culture</i>	Management Abilities	Process Outcomes	<b>Internal System</b>	<b>Work Processes and Functions</b>
<i>Beliefs, Values, Mission, and Vision of the Organisation</i>		Image and Values			
<i>Resources, Size, Capacity, and Capabilities of the Organisation</i>	<i>Enhanced Resources</i>	Organisational Resources	Resources		<b>Resources and Abilities Improvements</b>
	<i>Redundancy of Skills and Resources</i>		Resource and Skill Obsolescence and Loss		<b>Undesirable Consequences</b>
<i>Knowledge and Experience of Leaders and Employees</i>	<i>Increase in Productivity and Efficiency</i>	Management Capacity	Productivity	<b>Work Tasks</b>	<b>Productivity and Profitability</b>
<i>Task Accomplishment</i>	<i>Job Simplification, Performance</i>	Task Outputs			
<i>Task Outputs</i>					
<i>Task Content and Nature</i>	<i>Ease of Working and Management</i>	Task Contents	Process Outcomes		<b>Work Processes and Functions</b>
<i>Task Constraints and Facilitators</i>					
<i>Increase in Productivity and Performance</i>	<i>Increase in Profitability and Return On Investment (Roi)</i>	Value and Cost-Related Change	Profitability	<b>Emergent Outputs</b>	<b>Productivity and Profitability</b>
<i>Reducing, Optimising, and Containing Costs.</i>	<i>Cost Savings and Losses Reduction</i>				
<i>Change the Business Model and Create Value</i>	<i>Enhancement of Business Image</i>	Task-Related Change	Image Enhancement		<b>Business Image and Value</b>
<i>Change in Work Patterns, Work Attitude, and Culture</i>	<i>Ease of Working and Management</i>		Process Outcomes		<b>Work Processes and Functions</b>
<i>Process Improvements</i>	<i>Enhanced Work Patterns, Work Attitude, and Culture</i>				

<i>Change in the Decision and Organisational Structures</i>	<i>Decision Effectiveness and Usefulness</i>	Organisation Related Change	Function Outcomes		
<i>Introduction of Novel Resources</i>	<i>Increase in Productivity and Efficiency</i>	New Resources	Productivity	New Rules and Resources	<b>Productivity and Profitability</b>
<i>Introduction of New Rules For Operation</i>	<i>Task Performance and Innovation</i>	New Rules	Process Outcomes		<b>Work Processes and Function</b>
<i>New Modes and Ways of Working</i>					

### 5.4.3 Influence of Processes on Outcomes of DT of SMEs in DCs

Analysed responses from the three rounds of Delphi showed 23 first-order terms, 20 second-order themes and 15 third-order distinct dimensions of the influences of the processes on outcomes. The data structure of the terms, themes and dimensions of the DT drivers influence on outcomes is presented in Table 5.8.

**Table 5.8 Typologies of Influence of Processes on the Outcomes of DT**

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3 <sup>rd</sup> Order Dimensions	
Influencing Processes	Influenced Outcomes	Influencing Processes	Influenced Outcomes	Influencing Processes	Influenced Outcomes
<i>Procurement/Acquisition, Design, Development, Outsourcing,</i>	<i>Cost-Saving and Losses Reduction</i>	Decision Completion	Profitability	Decision-Making and Adoption	<b>Productivity and Profitability</b>
<i>System Identification and Adoption</i>	<i>Increase in Productivity and Efficiency</i>		Productivity		
<i>Awareness Creation, Stakeholder Engagement, Change Management</i>	<i>Stakeholder Satisfaction and Confidence</i>	Preparation	Stakeholder Satisfaction		<b>Customer and Stakeholder Satisfaction</b>
<i>Industry Scan, Benchmarking, Requirement Gathering.</i>	<i>Business Differentiation and Competitive Advantage</i>	Decision Initiation	Image Enhancement		<b>Business Image and Value</b>
<i>Training, Orientation</i>	<i>Facilitate Knowledge and Skills Development</i>	Implementation	Abilities	Implementation and Use	<b>Resources and Abilities Improvements</b>
	<i>Awareness Recall and Learning</i>	Preparation	Function Outcomes		<b>Work Processes and Function</b>
<i>Deployment, Implementation,</i>	<i>Ease of Working and Management</i>	Implementation	Process Outcomes		

<i>Installation, and Configuration</i>					
<i>Piloting and Testing</i>	<i>Challenges With Security and Privacy</i>	Operation	Security and Risk		<b>Undesirable Consequences</b>
<i>Use and Maintenance</i>	<i>Misuse and Misappropriation of Technology</i>				
<i>Changes to Functions, Processes, Operations</i>	<i>Ease of Working and Management</i>	Operational Change	Process Outcomes	<b>Changes in Function and Resources</b>	<b>Work Processes and Functions Improvement</b>
	<i>Job Simplification, Performance and Effectiveness</i>		Productivity		<b>Productivity and Profitability</b>
<i>Changes to Resources and Structures</i>	<i>Enhanced Resources</i>	Structural Changes	Resource		<b>Resources and Abilities Improvements</b>
	<i>Redundancy of Skills</i>		Resource and Skill Obsolescence and Loss		<b>Undesirable Consequences</b>
<i>Skills and Resource Alignment</i>	<i>Loss of Job and Employment</i>	Adjustments	Resources	<b>Adjustment and Adaptation</b>	<b>Resources and Abilities Improvements</b>
	<i>Redundancy of Skills</i>		Customer Satisfaction		<b>Customer and Stakeholder Satisfaction</b>
<i>Customer and Competitor Response</i>	<i>Improvement in Customer Satisfaction and Customer Retention</i>	Adjustments	Security and Risk		<b>Undesirable Consequences</b>
	<i>Challenges With Security and Privacy</i>		Productivity		
<i>Digitalisation and Technological Adaptation</i>	<i>Increase in Productivity and Efficiency</i>	Adaptations	Productivity		
<i>Business Model Changes and Development</i>	<i>Enhancement of Business Image</i>	Shifts	Image Enhancement	<b>Strategic Shifts and Positioning</b>	<b>Business Image and Value</b>
	<i>Business Differentiation and Competitive Advantage</i>		Value Enhancement		
	<i>Enhancement of Product and Service Values</i>		Profitability		
<i>Strategic Shifts and Positioning</i>	<i>Cost-Saving and Losses Reduction</i>		Profitability		<b>Productivity and Profitability</b>

**5.4.4 Influence of Outcomes on Drivers of DT of SMEs in DCs**

Analysed responses from the three rounds of Delphi showed 39 first-order terms, 24 second-order themes and 15 third-order distinct dimensions of the influences of outcomes on drivers. The data structure of the terms, themes and dimensions of the DT drivers influence on outcomes is presented in Table 5.9.

**Table 5.9 Typologies of Influence of Outcomes on the Drivers of DT**

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3 <sup>rd</sup> Order Dimensions	
Influencing Outcomes	Influenced Drivers	Influencing Outcomes	Influenced Drivers	Influencing Outcomes	Influenced Drivers
<i>Enhancement of Business image</i>	<i>Brand, Image, and reputation of the organisation</i>		Image and Values	<b>Business Image and Value</b>	<b>Internal System</b>
<i>Business differentiation and Competitive advantage</i>	<i>Competition and Survival</i>	Image enhancement	Competition		<b>External Environment</b>
<i>Enhancement of product and service values</i>	<i>Increase productivity and performance</i>	Value enhancement	Value and Cost related change		<b>Emergent Outputs</b>
<i>Enhanced work patterns, work attitude, and culture</i>	<i>Task accomplishment</i>			<b>Work Processes and Functions</b>	<b>Work Tasks</b>
	<i>Task output</i>		Task outputs		
<i>Task Performance and Innovation</i>	<i>Task accomplishment</i>	Process outcomes			
	<i>Task output</i>		Task contents		
	<i>Task content and nature</i>				
<i>Ease of working and management</i>	<i>Task accomplishment</i>				
	<i>Task output</i>		Task outputs		
<i>Timeliness and time-saving</i>	<i>Task accomplishment</i>				
	<i>Task output</i>	Function outcomes			
<i>Decision effectiveness and usefulness</i>	<i>Leadership style, interest, and drive of management</i>		Management Abilities		
<i>Job Simplification, Performance and Effectiveness</i>	<i>Task content and nature</i>	Productivity		<b>Productivity and Profitability</b>	<b>Work Tasks</b>
	<i>Task constraints and facilitators</i>		Task contents		
	<i>Task accomplishment</i>		Task outputs		

	<i>Task output</i>					
	<i>Increase productivity and performance</i>		Value and Cost related change		<b>Emergent Outputs</b>	
<i>Enhanced resources</i>	<i>Resources, size, capacity, and capabilities of the organisation</i>	Resources	Organisational Resources	<b>Resources and Abilities Improvements</b>	<b>Internal System</b>	
	<i>Increase productivity and performance</i>		Value and Cost related change		<b>Emergent Outputs</b>	
<i>Facilitate knowledge and skill development</i>	<i>Leadership style, interest, and drive of management.</i>	Abilities	Management Abilities		<b>Internal System</b>	
	<i>Knowledge and experience of leaders and employees</i>					
<i>Stakeholder satisfaction and confidence</i>	<i>Stakeholder demand and satisfaction</i>	Stakeholder satisfaction	Partnerships	<b>Customer and Stakeholder Satisfaction</b>	<b>External Environment</b>	
<i>Improvement in customer satisfaction and customer retention</i>	<i>Customer demand and satisfaction</i>	Customer satisfaction				
<i>Increase in productivity and efficiency</i>	<i>Increase productivity and performance</i>	Productivity	Value and Cost related change		<b>Emergent Outputs</b>	
<i>Cost savings and losses reduction</i>	<i>Reduce, optimise, and contain costs.</i>					
<i>Increase in Profitability and Return on Investment (ROI)</i>	<i>Increase productivity and performance</i>	Profitability	New Resources	<b>Productivity and Profitability</b>	<b>New Rules and Resources</b>	
	<i>Introduction of novel resources</i>				Value and Cost related change	<b>Emergent Outputs</b>
	<i>Change business model and create value</i>					
<i>Improvement in market share and business growth</i>	<i>Brand, Image, and reputation of the organisation</i>		Image and Values		<b>Internal System</b>	
	<i>Resources, size, capacity, and capabilities of the organisation</i>		Organisational Resources			
<i>High implementation and maintenance costs</i>	<i>Reduce, optimise, and contain costs.</i>	Additional cost burdens	Value and Cost related change			
<i>Loss of job and employment</i>	<i>Change in work patterns, work attitude, and culture</i>	Resource and skill obsolescence and loss	Task-related change	<b>Undesirable consequences</b>	<b>Emergent Outputs</b>	
	<i>Processes improvements</i>					

	<i>Change in the decision and organisational structures</i>		Organisation related change	
<i>Redundancy of skills and resources</i>	<i>Change in work patterns, work attitude, and culture</i>		Task-related change	
	<i>Processes improvements</i>			
	<i>Resources, size, capacity, and capabilities of the organisation</i>		Organisational Resources	<b>Internal System</b>
<i>Challenges with security and privacy</i>	<i>Introduction of new rules for operation</i>		New Rules	<b>New Rules and Resources</b>
	<i>New modes and ways of working</i>			
	<i>Change in the decision and organisational structures</i>		Organisation related change	<b>Emergent Outputs</b>
<i>Misuse and misappropriation of technology</i>	<i>Introduction of new rules for operation</i>	Security and Risk issues	New Rules	<b>New Rules and Resources</b>
	<i>New modes and ways of working</i>			
	<i>Change in the decision and organisational structures</i>		Organisation related change	<b>Emergent Outputs</b>
<i>Risks, hazards, health, and safety challenges</i>	<i>Introduction of new rules for operation</i>		New Rules	<b>New Rules and Resources</b>
	<i>New modes and ways of working</i>			
	<i>Change in the decision and organisational structures</i>		Organisation related change	<b>Emergent Outputs</b>

## 5.5 SMEs capabilities and Capacities influence on DT in DCs

In responding to the third research question and objective, the experts identified the capability and capacity of SMEs and how they influence the drivers, processes, and outcomes of DT in DCs. These findings from the analysis are presented in the following subsections:

### 5.5.1 SMEs Capabilities and Capacities in DT

Analysed responses from the three rounds of Delphi revealed 26 first-order terms, 11 second-order themes, and four third-order categories or aggregate dimensions of SMEs capabilities and capacities in accord with the conceptual framework. The data structure of the terms, themes and dimensions of the SMEs capabilities and capacities is presented in Table 5.10.

**Table 5.10 Typologies of SME Capabilities and Capacities in DT of DCs**

1 <sup>st</sup> Order Terms	2 <sup>nd</sup> Order Themes	3 <sup>rd</sup> order Dimensions
<i>Managers' Personal Beliefs, Values, and Principles</i>	<i>Intrinsic Attributes</i>	<b>Managerial Capabilities</b>
<i>Managers' Appreciation of Current Trends and Issues</i>		
<i>Understandability and Adaptability of Management</i>		
<i>Sensitivity and Response to Market Changes</i>	<i>Extrinsic Attributes</i>	
<i>Ability to Recognise and Seize an Opportunity.</i>		
<i>Ability to Reconfigure Resources</i>		
<i>External Informal and Formal Network Relationships</i>	<i>External Relationships</i>	
<i>Stimulating Stakeholder's Active Participation</i>	<i>Intrinsic Relationships</i>	
<i>Internal Relationships and Networks With Employees</i>		
<i>Education of Managers</i>		
<i>Knowledge Possessed By Managers.</i>	<i>Intrinsic Knowledge</i>	<b>Managerial Capacities</b>
<i>Technical and Conceptual Skills of Managers</i>	<i>Intrinsic Skills</i>	
<i>Digital Technology Competence</i>	<i>Intrinsic Experience</i>	
<i>The Experience Possessed By Managers.</i>		
<i>Training of Personnel</i>	<i>Intrinsic Organisational Capabilities</i>	<b>Organisational Capabilities</b>
<i>Channel Management Capabilities</i>		
<i>New Service Delivery Capabilities</i>		
<i>Cost Leadership Capabilities</i>	<i>Extrinsic Organisational Capabilities</i>	
<i>Market Leadership Capabilities</i>		
<i>Research and Development Capabilities</i>		
<i>Pillars of Competitive Advantage</i>	<i>Intrinsic Organisational Capacities</i>	<b>Organisational Capacities</b>
<i>Available Organisational Resources</i>		
<i>Size and Structure of Business Operation</i>		
<i>Industry, Sector, and Operational Type</i>		
<i>Development or Acquisition of IT Infrastructure</i>	<i>Extrinsic Organisational Capacities</i>	
<i>Development or Sourcing of IT Human Capital</i>		

**5.5.2 SMEs Capabilities and Capacities Influence on DT Drivers**

Analysed responses from the three rounds of Delphi revealed 29 first-order terms, 24 second-order themes, and 13 third-order categories or aggregate dimensions of SMEs capabilities and capacities’ influence on DT drivers, in accord with the conceptual framework. The data structure of the terms, themes and dimensions of the SMEs capabilities and capacities is presented in Table 5.11.

**Table 5.11 Typologies of Effects of SMEs capabilities and Capacities on the Drivers of DT**

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3 <sup>rd</sup> Order Dimensions		
Influencing Capabilities and Capacities	Influenced Drivers	Influencing Capabilities and Capacities	Influenced Drivers	Influencing Capabilities and Capacities	Influenced Drivers	
<i>Managers' personal beliefs, values, and principles</i>	<i>Leadership interest and drive of managers</i>	<i>Intrinsic Managerial attributes</i>	Management Abilities	<b>Managerial Capabilities</b>	<b>Internal System</b>	
<i>Managers' appreciation of current trends and issues ' </i>	<i>Introduction of novel resources</i>		New Resources		<b>New Rules and Resources</b>	
	<i>Introduction of new rules for operation</i>		New Rules			
	<i>New modes and ways of working</i>					
<i>Understandability and adaptability of management</i>	<i>Change the business model and create value</i>	<i>Extrinsic attributes</i>	Organisation related		<b>Emergent Outputs</b>	
<i>Sensitivity and response to market changes</i>	<i>Competition and survival</i>		Competition			<b>External Environment</b>
	<i>Customer demand and satisfaction</i>		Partnerships (customers and stakeholders)			
<i>Ability to recognise and seize an opportunity.</i>	<i>Leadership style, interest, and drive of management</i>		Management Abilities			<b>Internal System</b>
<i>Ability to reconfigure resources</i>	<i>Change the business model and create value</i>	Organisation related	<b>Emergent Outputs</b>			
<i>External informal and formal network relationships</i>	<i>Competition and Survival</i>	<i>Extrinsic relationships</i>	Competition		<b>External Environment</b>	
<i>Stimulating stakeholder's active participation</i>	<i>Stakeholder demands and satisfaction</i>		Partnerships (customers and stakeholders)			

<i>Internal relationships and networks with employees</i>	<i>Task accomplishment</i>	<i>Intrinsic relationships</i>	Task output		<b>Work Tasks</b>	
<i>Education of managers</i>	<i>Knowledge and experience of leaders and employees</i>	<i>Intrinsic Knowledge</i>	Management Abilities	<b>Managerial Capacities</b>	<b>Internal System</b>	
<i>Knowledge possessed by managers.</i>						
<i>Technical and conceptual skills of managers</i>		<i>Intrinsic Skills</i>	New Resources			<b>New Rules and Resources</b>
<i>Digital technology competence</i>	<i>Introduction of novel resources</i>					<b>Internal System</b>
<i>Experience possessed by managers.</i>	<i>Knowledge and experience of leaders and employees</i>	<i>Intrinsic Experience</i>	Management Abilities			<b>Internal System</b>
<i>Training of personnel</i>	<i>Task accomplishment</i>	<i>Intrinsic organisational capabilities</i>	Task outputs		<b>Organisational Capacities</b>	<b>Work Tasks</b>
<i>Channel management capabilities</i>	<i>Customer demand and satisfaction</i>		Partnerships (customers and stakeholders)	<b>External environment</b>		
<i>New service delivery capabilities</i>	<i>Task accomplishment</i>		Task output	<b>Work Tasks</b>		
<i>Cost leadership capabilities</i>	<i>Resources, size, capacity, and capability of the organisation</i>		Organisational Resources	<b>Internal System</b>		
<i>Market leadership capabilities</i>	<i>Customer demand and satisfaction</i>	Partnerships (customers and stakeholders)	<b>External Environment</b>			
<i>Research and development abilities</i>	<i>Introduction of novel resources</i>	New Resources	<b>New Rules and Resources</b>			
<i>Pillars of competitive advantage</i>	<i>Competition and Survival</i>		Competition		<b>External Environment</b>	
<i>Available organisational resources</i>	<i>Resources, size, capacity, and capability of the organisation</i>	<i>Intrinsic organisational capabilities</i>	Organisational Resources	<b>Organisational Capacities</b>	<b>Internal System</b>	
<i>Size and structure of business operation</i>						
<i>Type of Industry, sector, and operational type</i>						
<i>Development or acquisition of IT infrastructure</i>		<i>Extrinsic organisational capabilities</i>				
<i>Development or sourcing IT human capital</i>	<i>Task accomplishment</i>		Task output			<b>Work Tasks</b>

### 5.5.3 SMEs Capabilities and Capacities Influence on the DT Processes

Analysed responses from the three rounds of Delphi revealed 37 first-order terms, 27 second-order themes, and 23 third-order categories or aggregate dimensions of SMEs capabilities and capacities’ influence on DT processes, in accord with the conceptual framework. The data structure of the terms, themes and dimensions of the SMEs capabilities and capacities is presented in Table 5.12.

**Table 5.12 Typologies of Effects of SMEs capability and Capacity on the Processes of DT**

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3 <sup>rd</sup> Order Dimensions		
Influencing Capabilities and Capacities	Influenced Processes	Influencing Capabilities and Capacities	Influenced Processes	Influencing Capabilities and Capacities	Influenced Processes	
<i>Managers' Personal Beliefs, Values, and Principles</i>	<i>Need Analysis/Assessment, Problem Identification, and Business Case.</i>	<i>Intrinsic Managerial Attributes</i>	Decision Initiation	<b>Managerial Capabilities</b>	<b>Decision-Making and Adoption</b>	
	<i>Awareness Creation, Stakeholder Engagement, Change Management</i>		Preparation		<b>Implementation and Use</b>	
	<i>Industry Scan, Benchmarking, Requirement Gathering.</i>		Decision Initiation		<b>Decision-Making and Adoption</b>	
<i>Managers' Appreciation of Current Trends and Issues ' </i>	<i>Procurement/Acquisition, Design, Development, Outsourcing,</i>		Decision Completion			
<i>Understandability and Adaptability of Management</i>	<i>System Identification and Adoption</i>		Adjustments			<b>Adjustment and Adaptation</b>
<i>Sensitivity and Response to Market Changes</i>	<i>Customer and Competitor Response</i>		Decision Completion			<b>Decision-Making and Adoption</b>
<i>Ability to Recognise and Seize an Opportunity.</i>	<i>System Identification and Adoption</i>		<i>Extrinsic Attributes</i>		Structural Changes	<b>Changes in Function and Resources</b>
<i>Ability to Reconfigure Resources</i>	<i>Changes to Resources and Structure</i>	<i>Extrinsic Relationships</i>	Adjustments		<b>Adjustment and Adaptation</b>	
<i>External Informal and Formal Network Relationships</i>	<i>Customer and Competitor Response</i>		Positioning		<b>Strategic Shifts and Positioning</b>	
<i>Stimulating Stakeholder's Active Participation</i>	<i>Strategic Positioning and Consolidation</i>					

<i>Internal Relationships and Networks With Employees</i>	<i>Digitalisation and Technological Adaptation</i>	<i>Internal Relationships</i>	Adaptations	<b>Managerial Capacities</b>	<b>Adjustment and Adaptation</b>	
<i>Education of Managers</i>	<i>System Identification and Adoption</i>	<i>Intrinsic Knowledge</i>	Decision Completion		<b>Decision-Making and Adoption</b>	
	<i>Skills and Resource Alignment</i>		Adjustments		<b>Adjustment and Adaptation</b>	
<i>Knowledge Possessed By Managers.</i>	<i>Skills and Resource Alignment</i>		Implementation		Implementation	<b>Implementation and Use</b>
	<i>Training, Orientation</i>					
	<i>Deployment, Implementation, Installation, and Configuration</i>					
	<i>Training, Orientation</i>					
<i>Technical and Conceptual Skills of Managers</i>	<i>Deployment, Implementation, Installation, and Configuration</i>		<i>Intrinsic Skills</i>		Operation	<b>Adjustment and Adaptation</b>
	<i>Use and Maintenance</i>				Adjustments	
	<i>Skills and Resource Alignment</i>					
<i>Digital Technology Competence</i>	<i>Training, Orientation</i>		<i>Intrinsic Experience</i>	Implementation	<b>Implementation and Use</b>	
	<i>Deployment, Implementation, Installation, and Configuration</i>					
	<i>Piloting and Testing</i>					
<i>Experience Possessed By Managers.</i>	<i>Training, Orientation</i>	Adjustments	Adjustments	<b>Adjustment and Adaptation</b>		
	<i>Deployment, Implementation, Installation, and Configuration</i>					
<i>Skills and Resource Alignment</i>						
<i>Training of Personnel</i>	<i>Training and Orientation</i>	<i>Intrinsic Organisational Capabilities</i>	Implementation	<b>Implementation and Use</b>		
<i>Channel Management Capabilities</i>	<i>Customer and Competitor Response</i>	<i>Extrinsic Organisational Capabilities</i>	Adjustments	<b>Adjustment and Adaptation</b>		
<i>New Service Delivery Capabilities</i>	<i>Business Models Change and Development</i>		Shifts	<b>Strategic Shifts and Positioning</b>		
<i>Cost Leadership Capabilities</i>	<i>Changes to Functions, Processes, and Operations</i>	<i>Extrinsic Organisational Capabilities</i>	Operational Change	<b>Changes in Function and Resources</b>		
<i>Market Leadership Capabilities</i>	<i>Customer and Competitor Response</i>		Adjustments	<b>Adjustment and Adaptation</b>		
<i>Research and Development Abilities</i>	<i>System Identification and Adoption</i>		Decision Completion	<b>Decision-Making and Adoption</b>		
				<b>Organisational Capabilities</b>		

	<i>Training, Orientation</i>		Implementation		<b>Implementation and Use</b>
<i>Pillars of Competitive Advantage</i>	<i>Customer and Competitor Response</i>		Adjustments		<b>Adjustment and Adaptation</b>
<i>Available Organisational Resources</i>	<i>Changes to Resources and Structure</i>	<i>Intrinsic Organisational Capacities</i>	Structural Changes	<b>Organisational Capacities</b>	<b>Changes in Function and Resources</b>
<i>Size and Structure of Business Operation</i>	<i>Changes to Function, Processes, Operation</i>		Operational Change		
<i>Industry, Sector, and Operational Type</i>	<i>Business Model Changes and Development</i>		Shifts		
<i>Development or Acquisition of IT Infrastructure</i>	<i>Digitalisation and Technological Adaptation</i>	<i>Extrinsic Organisational Capacities</i>	Adaptations		<b>Adjustment and Adaptation</b>
<i>Development or Sourcing of IT Human Capital</i>	<i>Skills and Resource Alignment</i>		Adjustments		

### 5.5.4 SMEs Capabilities and Capacities Influence on DT Outcomes

Analysed responses from the three rounds of Delphi revealed 29 first-order terms, 24 second-order themes, and 16 third-order categories or aggregate dimensions of SMEs capabilities and capacities influence DT outcomes per the conceptual framework. The data structure of the terms, themes and dimensions of the SMEs capabilities and capacities is presented in Table 5.13.

**Table 5.13** *Typologies of Effects of Capabilities and Capacities on the Outcomes of DT*

1 <sup>st</sup> Order Terms		2 <sup>nd</sup> Order Themes		3 <sup>rd</sup> Order Dimensions	
Influencing Capabilities and Capacities	Influenced Outcomes	Influencing Capabilities and Capacities	Influenced Outcomes	Influencing Capabilities and Capacities	Influenced Outcomes
<i>Managers' Personal Beliefs, Values, and Principles</i>	<i>Enhancement of Business Image</i>	<i>Intrinsic Managerial Attributes</i>	Image Enhancement	<b>Managerial Capacities</b>	<b>Business Image and Value</b>
<i>Managers' Appreciation of Current Trends and Issues</i>	<i>Business Differentiation and Competitive Advantage</i>		Image Enhancement		
<i>Understandability and Adaptability of Management</i>	<i>Enhanced Work Patterns, Work Attitude, Cultural Decisions, or</i>		Process Outcomes		<b>Work Processes and Functions</b>

	<i>Organisation Structure</i>				
<i>Sensitivity and Response to Market Changes</i>	<i>Improvement in Market Shares and Business Growth</i>	<i>Extrinsic Attributes</i>	Profitability		<b>Productivity and Profitability</b>
<i>Ability to Recognise and Seize an Opportunity.</i>	<i>Increase in Productivity and Efficiency</i>		Productivity		
<i>Ability to Reconfigure Resources</i>	<i>Redundancy of Skills and Resources</i>		Resource and Skill Obsolescence and Loss		
<i>External Informal and Formal Network Relationships</i>	<i>Improvement in Customer Satisfaction and Customer Retention</i>	<i>Extrinsic Relationships</i>	Customer Satisfaction		<b>Customer and Stakeholder Satisfaction</b>
<i>Stimulating Stakeholder's Active Participation</i>	<i>Stakeholder Satisfaction and Confidence</i>		Stakeholder Satisfaction		
<i>Internal Relationships and Networks With Employees</i>	<i>Enhanced Work Patterns, Work Attitude, Cultural Decisions, or Organisation Structure</i>	<i>Intrinsic Relationships</i>	Process Outcomes		<b>Work Processes and Functions</b>
<i>Education of Managers</i>	<i>Facilitate Knowledge and Skills Development</i>	<i>Intrinsic Knowledge</i>	Abilities		<b>Resources and Abilities Improvements</b>
<i>Knowledge Possessed By Managers.</i>					
<i>Technical and Conceptual Skills of Managers</i>		<i>Intrinsic Skills</i>	Process Outcomes		
<i>Digital Technology Competence</i>					
<i>Experience Possessed By Managers.</i>	<i>Facilitate Knowledge and Skills Development</i>	<i>Intrinsic Experience</i>	Abilities		<b>Resources and Abilities Improvements</b>
<i>Training of Personnel</i>	<i>Ease of Working and Management</i>	<i>Intrinsic Organisational Capabilities</i>	Process Outcomes		<b>Work Processes and Functions</b>
	<i>Job Simplification Performance and Effectiveness</i>		Productivity		<b>Productivity and Profitability</b>
	<i>Misuse and Misappropriation</i>		Security and Risk		<b>Undesirable Consequences</b>
<i>Channel Management Capabilities</i>	<i>Improvement in Market Share and Business Growth</i>		Profitability		<b>Productivity and Profitability</b>
<i>New Service Delivery Capabilities</i>	<i>Enhancement of Product and Service Quality Delivery</i>		Value Enhancement		<b>Business Image and Value</b>

<i>Cost Leadership Capabilities</i>	<i>Cost-Saving and Loss Reduction</i>	<i>Extrinsic Organisational Capabilities</i>	Profitability	<b>Organisational Capacities</b>	<b>Productivity and Profitability</b>
<i>Market Leadership Capabilities</i>	<i>Improvement in Market Share and Business Growth</i>		Profitability		
<i>Research and Development Abilities</i>	<i>Enhancement of Product and Service Values</i>		Value Enhancement		<b>Business Image and Value</b>
<i>Pillars of Competitive Advantage</i>	<i>Business Differentiation and Competitive Advantage</i>		Image Enhancement		
<i>Available Organisational Resources</i>	<i>Enhanced Resources</i>	<i>Intrinsic Organisational Capabilities</i>	Resources	<b>Organisational Capacities</b>	<b>Resources and Abilities Improvements</b>
	<i>Cost-Saving and Loss Reduction</i>		Profitability		<b>Productivity and Profitability</b>
<i>Size and Structure of Business Operation</i>	<i>High Implementation and Maintenance Cost</i>		Image Enhancement		<b>Business Image and Value</b>
<i>Industry, Sector, and Operational Type</i>	<i>Enhancement of Business Image</i>		Resource and Skill Obsolescence and Loss		<b>Undesirable Consequences</b>
<i>Development or Acquisition of IT Infrastructure</i>	<i>Redundancy of Skills and Resources</i>	<i>Extrinsic Organisational Capabilities</i>	Resource and Skill Obsolescence and Loss	<b>Organisational Capacities</b>	<b>Undesirable Consequences</b>
<i>Development or Sourcing of IT Human Capital</i>	<i>Loss of Job and Employment</i>				

## 5.6 Chapter Summary

The reporting of the study's findings was based on the objectives of the study and the themes identified. The study identified twelve different digital technology types used in the DT of SMEs in DCs. The main findings included six dimensions of drivers for DT, five categories of processes of DT, and six categories of outcomes of DT. The drivers were found to influence the processes and outcomes, while the processes influenced the outcomes, and the outcomes influenced the drivers. Meanwhile, these factors are also influenced by the SMEs capabilities and capacities.

## CHAPTER SIX


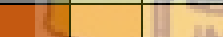
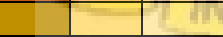


### 6 DISCUSSIONS OF FINDINGS

#### 6.1 Chapter Overview

This chapter discusses findings in response to the preliminary inquiries and the research questions, which demonstrate the achievement of the research objectives. The discussions are presented in four sections regarding digital technologies and the three research questions. The first section discusses the findings relating to the digital technologies used in the DT of SMEs in DCS. The second section discusses the findings of the first research question about what constitutes the drivers, processes, and outcomes of DT of SMEs in DCs. The third section discusses the findings regarding the second research question on how the drivers, processes, and outcomes relate to and influence one another in the DT of SMEs in DCs. The fourth section presents the discourse of the findings regarding the third research question on how the SMEs capabilities and capacities influence the DT drivers, processes, and outcomes.

The legend of colour codes used in the tables and figures of this chapter to represent the different factors and typologies is shown in Table 6.1

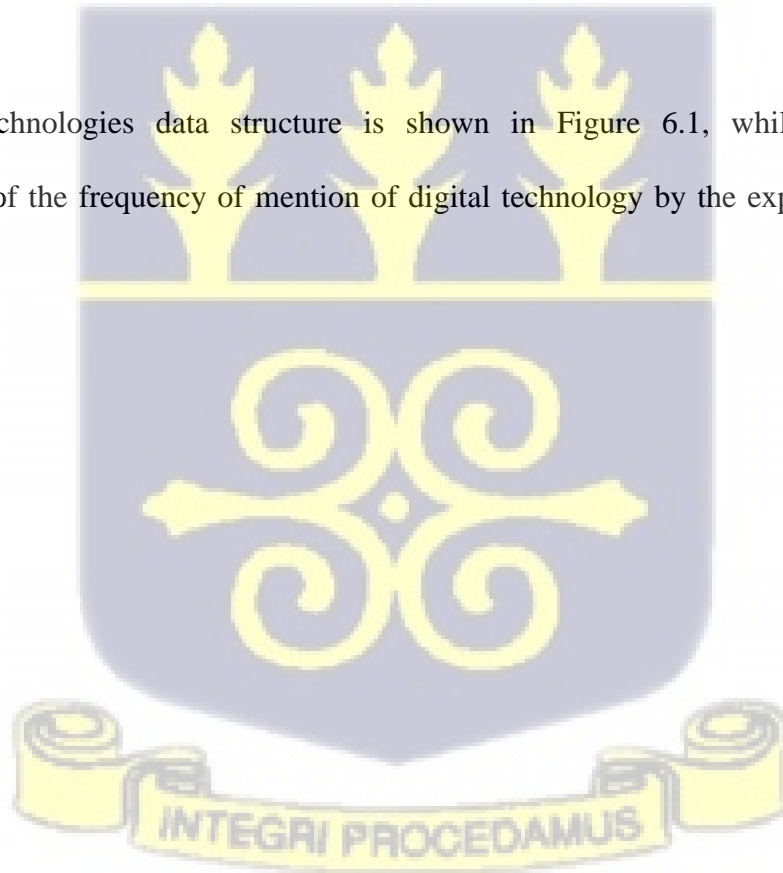
**Table 6.1 Legend of Colour Codes in Tables and Figures of Chapter 6**

Colour	Shades of Colours	Typologies Represented
<i>Greyish</i>		Digital Technologies
<i>Reddish</i>		Drivers of DT
<i>Yellowish</i>		Processes of DT
<i>Greenish</i>		Outcomes of DT
<i>Blueish</i>		Capabilities and Capacities of SMEs

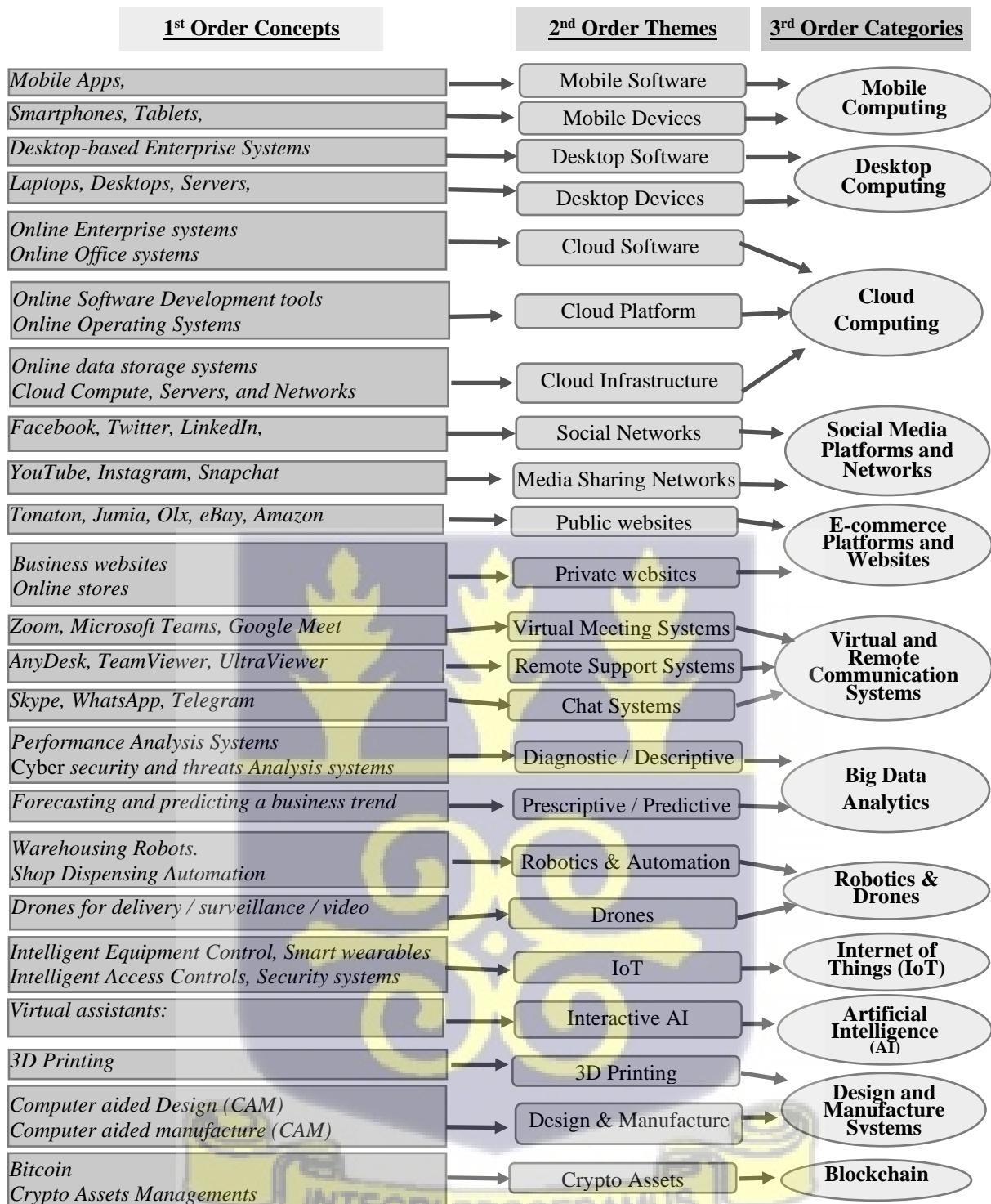
## 6.2 Digital Technologies Deployed in the DT of SMEs

As presented in Section 5.2, the findings respond to the need to periodically review the digital technologies used in DT and the rapid changes in the trends and features of such technologies (Châlons & Dufft, 2017). The findings show that digital technology adoption and use among SMEs in DCs for DT are represented in twelve different technology categories or dimensions (Table 5.1). These dimensions are mobile computing, desktop computing, cloud computing, social media platforms and networks, e-commerce platforms and websites, and virtual and remote communication systems. The rest are big data analytics, robotics and drones, artificial intelligence (AI), the internet of things (IoT), design and manufacturing systems, and blockchain technologies.

The digital technologies data structure is shown in Figure 6.1, while the graphical representation of the frequency of mention of digital technology by the experts is shown in Figure 6.2

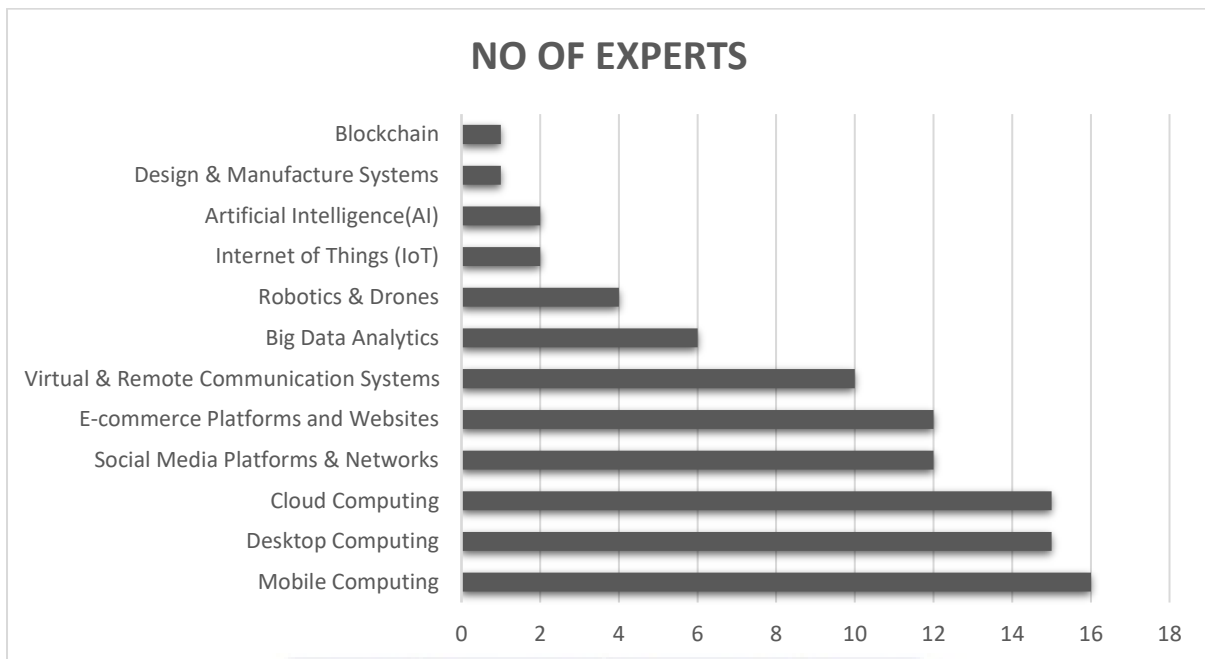


**Figure 6.1 Data Structure of Digital Technologies used in DT of SMEs**



Note. Source: Researcher's Constructs

**Figure 6.2** *Typologies of Digital Technologies used in DT of SMEs*



*Note.* Source: Researcher’s Constructs

Mobile computing, desktop computing, and cloud computing were mentioned by 15 to 16 experts and represented the most frequently used. Meanwhile, extant literature usually cites cloud computing and mobile computing as the most frequently used technologies for SMEs’ DT (Al Maamari & Bhuiyan, 2021; Khayer et al., 2020). Other extant literature highlights the same in addition to social media contributing to SMEs’ DT in DCs (e.g., Eze et al., 2019; Ulas, 2019; Ziyadin, 2019). However, mobile devices have been touted as the single technology commonly embraced in DCs and used by individuals and businesses (Ezeokoli et al., 2019; Xu et al., 2021). Therefore, it is not surprising that all the experts reported mobile computing.

Meanwhile, social media platforms, e-commerce platforms, and virtual and remote communication systems are also highlighted as technologies for SMEs’ DT (Eze et al., 2019; Khayer et al., 2020; Tan et al., 2015; Ziyadin, 2019). These technologies were mentioned by 10 to 12 experts, showing their significance for the DT of SMEs in DCs. Social media platforms

have been reviewed extensively in the extant literature on DT of SMEs (e.g., Chen et al., 2021; Eze et al., 2019; Fachrunnisa et al., 2020; Khayer et al., 2020; Ziyadin, 2019). Khairuddin and Olowosuyi (2020) identify social media as critical in enhancing the organisational competitiveness of SMEs in DCs.

The technology dimensions that have attracted much attention in the COVID-19 era and beyond are the virtual and remote communication systems, cloud computing and network platforms (e.g., Khairuddin & Olowosuyi, 2020; Thapa et al., 2022). These same digital technologies were identified in the study, and their increased use in the COVID-19 era was confirmed during the interviews. Kumar and Ayedee (2021) suggest that SMEs' technological adoption has increased tremendously in the COVID-19 era to overcome the restrictions and challenges associated with the pandemic, and the most critical technologies in vogue are virtual meeting systems like Zoom. Meanwhile, the primary victims of the outbreak are micro and SMEs, especially in developing countries, mainly because of the limited use of digital technologies (Bai et al., 2021).

On the other hand, there is the observation that SMEs in DCs scarcely use big data analytics, robotics and drones, additive manufacturing, blockchain, AI and IoT in their DT (Khin & Ho, 2019). Though this observation is deduced from the fewer experts that mentioned them, it could also be due to SMEs' lower capabilities and capacities in handling such technologies in DCs (Tiwari et al., 2006). Usually, such technologies require higher managerial and organisational capabilities to manage, which could be beyond the reach of SMEs (Khin & Ho, 2019). These findings are echoed in a recent report on Data-Driven Enterprises in Africa by Boateng (2022).

Notwithstanding the frequent or infrequent use of digital technologies in SMEs of DCs for DT, the mention of 12 different dimensions of digital technologies is significant. These dimensions reflect the diversity of digital technology adoption and the variety of digital technologies available in DCs (e.g. (Khairuddin & Olowosuyi, 2020; Priyono et al., 2020; Tiwari et al., 2006). Some experts believe that SMEs' activities and sectors characterise digital technology use (Priyono et al., 2020).

This view is succinctly put by an executive officer of one digital technology management organisation who said:

*The type and intensity of digital technology use among the SMEs in DCs vary depending on what the SMEs seek to do and the business activities that can be addressed with digital technologies. - (Expert's interview response, 29/ 10/2020).*

The above assertion and the findings in Table 5.2 show that diverse digital technology classes are employed for SMEs' unique purposes in DCs. Nevertheless, digital technologies categories produce different use and application from SME to SME and sector to sector. Digital technologies with diverse functionalities have also allowed SMEs to address their business needs. The typology of digital technologies in DT of SMEs is presented in Table 6.2

The preceding discussions reflect the following findings:

### **Findings 1: Digital Technologies**

**Finding 1a:** *The digital technologies more frequently used in the DT of SMEs in DCs are of six dimensions, namely: mobile computing, desktop computing, cloud computing, social media platforms, e-commerce sites and virtual and remote communication systems.*

Finding 1b: Other digital technology types less frequently used in the DT of SMEs in DCs are also of six dimensions, namely: Big Data Analytics, Robotics and Drones, Internet of Things (IoT), Interactive AI, Design and Manufacturing Systems, and Blockchain.

Finding 1c: COVID-19 pandemic has caused increased use of digital technologies, especially the virtual and remote communication systems in SMEs of DCs.

**Table 6.2 Typology of Digital Technologies in DT of SMEs**

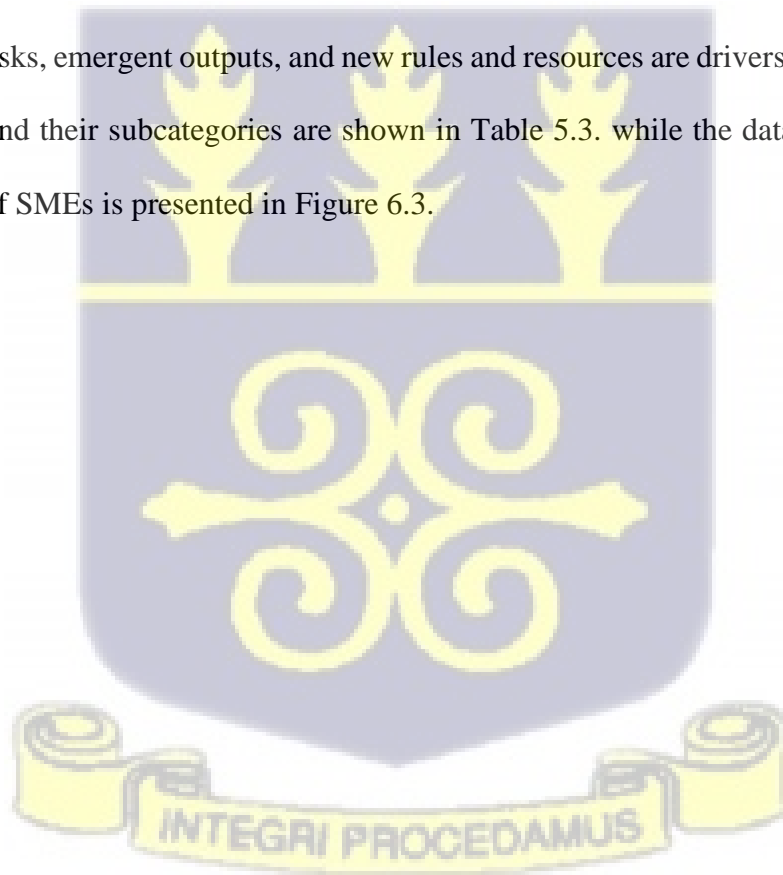
<u>Main Factors</u>	<u>Sub Factors</u>	<u>References</u>	
<b>Mobile Computing</b>	Mobile Software	Xu et al. (2021)	MORE FREQUENT USE
	Mobile Devices		
<b>Desktop Computing</b>	Desktop Applications	Ziyadin (2019)	
	Desktop Devices		
<b>Cloud Computing</b>	Cloud Computing	Khayer et al. (2020)	
	Cloud Platform		
	Cloud Infrastructure		
<b>Social Media Platforms and Networks</b>	Social Interaction Networks	Khairuddin & Olowosuyi (2020)	
	Media Sharing Networks		
<b>E-commerce Platforms and Websites</b>	Public Websites	Fachrunnisa et al. (2020)	
	Private Websites		
<b>Virtual and Remote Communication Systems</b>	Virtual Meeting systems	Kumar & Ayedee (2021)	
	Remote Support systems		
	Text/Voice/Video Chats		
<b>Big data Analytics</b>	Diagnostic / Descriptive	Ezeokoli et al. (2019); Khin & Ho (2019)	
	Prescriptive / Predictive		
<b>Robotics and Drones</b>	Robotics and Automation	Chatterjee et al.. (2021); Khin & Ho (2019)	
	Drones		
<b>Internet of Things (IoT)</b>	Internet of Things (IoT)	Yousaf et al. (2021); Tiwari et al. (2006)	
<b>Interactive AI</b>	Interactive AI	Chatterjee et al. (2021)	
<b>Design and Manufacture Systems</b>	3D Printing,	Ulas (2019; Tiwari et al. (2006)	
	Design and Manufacture		
<b>Blockchain</b>	Crypto Assets	Titko (2019; Tiwari et al. (2006)	Less frequent use

### 6.3 Drivers, Processes, and Outcomes of the DT of SMEs

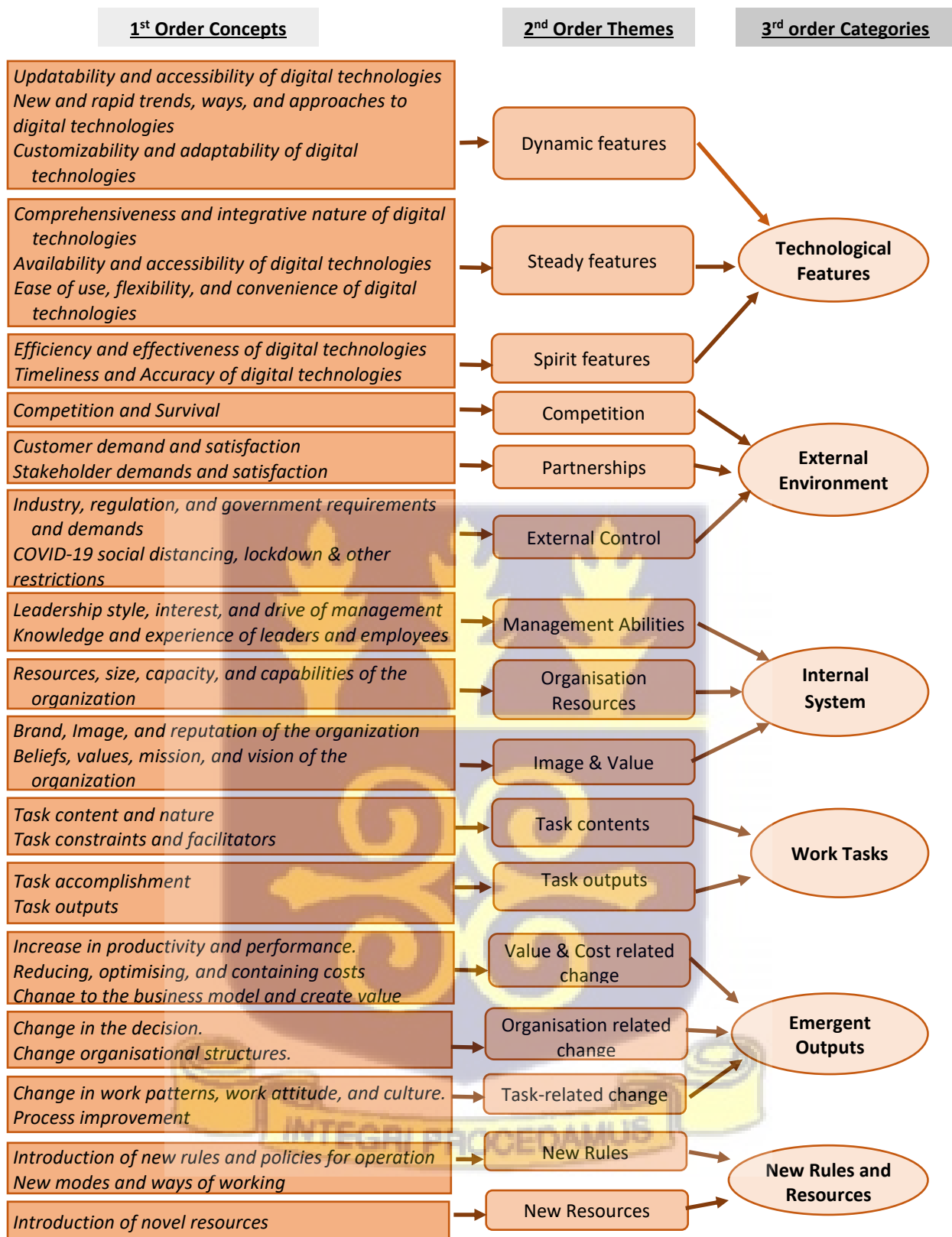
The drivers, processes, and outcomes identified from the study and presented in Section 5.3 in response to the first research objective are discussed under separate subsections for each factor. These findings also respond to the need to review DT factors periodically to reflect the changing trends and nature of digital technologies (Châlons & Dufft, 2017; Hanelt et al., 2021; Solis & Littleton, 2017; Verhoef et al., 2021).

#### 6.3.1 Drivers of DT of SMEs in DCs

As presented in Section 5.3.1, the findings show six major dimensions of drivers that constitute the DT drivers for SMEs in DCs. Technological features, external environment, internal system, work tasks, emergent outputs, and new rules and resources are drivers. The dimensions of the drivers and their subcategories are shown in Table 5.3. while the data structure of the drivers of DT of SMEs is presented in Figure 6.3.



**Figure 6.3 Data Structure of Drivers of DT of SMEs**



Note. Source: Researcher's Constructs

The findings show that the technological features as drivers of DT are made up of *steady*, *dynamic*, and *spirit* features. This classification of technological features as drivers is hitherto not known in literature. The *steady* features are the structural features and attributes of digital technology, which are innate, constant, and fixed. They are associated with comprehensiveness, accessibility, and ease of use (Châlons & Dufft, 2017; Hrustek et al., 2019; Ismail et al., 2017). The *dynamic* features are the structural features and attributes of digital technology that are changing, flexible, and improving. They relate to updatability, customisability, adaptability, flexibility, integrability, and changing trends (Liere-Netheler et al., 2018; Morakanyane et al., 2017; Osmundsen et al., 2018; Xu et al., 2020). The *spirit* features are the overall intentions regarding goals and values fundamental to the structural features. They involve service delivery efficiency, effectiveness, timeliness, and accuracy (Al Maamari & Bhuiyan, 2021; Dehnert, 2020; Hrustek et al., 2019).

However, the classification of technology features into structural and spirit features as presented by AST is well-acknowledged in the literature (e.g., Châlons & Dufft, 2017; Hrustek et al., 2019; Ismail et al., 2017; Liere-Netheler et al., 2018; Morakanyane et al., 2017; Osmundsen et al., 2018; Xu et al., 2020). According to Kane et al. (2015), even though sufficient digital competence, strategies, and talents are significant in driving DT, the new and changing features, and functionalities of emerging digital technologies cannot be discounted as critical driving factors for the DT of SMEs. These *steady* (fixed), *dynamic* (changing), and *spirit* (goals and values) features of technologies complexly interact to meet SMEs' needs and technologically drive their adoption of digital technologies (Pari et al., 2020; Suwandi et al., 2020). Therefore, classifying the technological feature drivers into dynamic, steady, and spirit features is a new typology from the study.

The external environmental conditions in which the SMEs operate also drive DT (Haffke et al., 2017). In DCs, SMEs' external environmental conditions are characterised by high competition and survival, differentiated customer demands, uncertain industrial regulation, and government requirements and demands (Chandra et al., 2020; Helbing, 2019). DT, therefore, comes as one of the safety nets for SMEs trying to manage competition (Zaki, 2019). This view is concisely expressed by one of the experts, who said:

*“Experience shows that the main driver of DT in Ghana is the determination to remain competitive in a turbulent environment by creating value for customers and employees. (Expert’s interview response, 05/11/2020).”*

COVID-19 and its associated restrictions have also become a powerful driver for DT (Indriastuti & Fuad, 2020). Therefore, it is not surprising that all the experts mentioned and confirmed that the restrictions associated with COVID-19 are major external drivers for DT. Priyono et al. (2020) reiterate that SMEs have been overwhelmed by the untoward effects of the outbreak of COVID-19, which has become a push and driver for DT (Indriastuti & Fuad, 2020). The effect is that SMEs seek to implement technological systems that facilitate working from home or anywhere and anytime. This pandemic has increased SMEs' virtual meeting systems, remote support systems, and online ERP use (Kumar & Ayedee, 2021).

One observation made in this study is that digital technologies adoption and DT of SMEs in DCs are also motivated by internal systems (Gomes et al., 2020; Pihir et al., 2019). The resources discovered in this study include leadership style, interest, and drive of management; beliefs, values, mission, and vision of the organisation; knowledge and experience of leaders and employees (Al Maamari & Bhuiyan, 2021). The study found that leadership and management play a significant role in evolving and cultivating an organisational culture for

digital skills development and DT among SMEs in DCs (Cortellazzo et al., 2019; Castagna et al., 2020; Gomes et al., 2020). These internal systems dynamics are well noted in the extant literature as facilitating DT (Al Maamari & Bhuiyan, 2021). Management's experience and knowledge of digital technologies contribute to the drive toward DT (Hrustek et al., 2019; Liere-Netheler et al., 2018).

Additionally, the study found that the organisation's resources, size, capacity, capabilities, brand, image, and reputation are essential drivers for SMEs' DT in DCs (Morakanyane et al., 2017; Osmundsen et al., 2018). Organisations require resources to undertake DT, and the amount and nature of resources needed would vary based on the firm's size and structure and the intended transformation (Reis et al., 2018). In some cases where the desire for DT exists, the number of resources available to the SMEs may be necessary to decide whether to undergo a DT (Al Maamari & Bhuiyan, 2021). The capabilities and capacities regarding technical and managerial ability also drive SMEs' desire for DT (Weritz et al., 2020). Typically, large firms are more motivated to undergo DT because of their higher resources and competence than smaller firms (OECD, 2018). Therefore, DT motivation also results from the firm's size, resources, and capability.

The findings also uncover work tasks as a driver for SMEs' DT. The identified work task drivers include task content and nature, task constraints and facilitators, task outputs, and task accomplishment. These work tasks as drivers of DT are novel in literature (Liere-Netheler et al., 2018; Osmundsen et al., 2018; Parida et al., 2019; Suwandi et al., 2020). Others mentioned in the literature that comes close to them are workplace improvement, process improvement, and vertical and horizontal integration (e.g., Liere-Netheler et al., 2018; Osmundsen et al., 2018; Parida et al., 2019), which are output related and not the same.

This study also discovered *emergent outputs*, which are the outputs of the interaction between digital technologies and organisation, an essential driver for DT. This drive is manifested in outcomes of increasing productivity and performance, reducing, optimising, and containing costs and changes in the business model that create value (Li et al., 2018). Many studies have reported positive outcomes from DT but have not considered them as DT drivers (Liere-Netheler et al., 2018; Osmundsen et al., 2018). However, Mahmood et al. (2019) indicate the possibility of DT outcomes driving DT. For SMEs in DCs, DT has resulted in process improvement, workplace improvement and cost reduction (Liere-Netheler et al., 2018; Nambisan et al., 2019). These outputs result from the organisation's interaction with the technologies leading to emerging beneficial outcomes, which become drivers of DT but are not considered as such in the literature.

The findings further show that introducing new rules and policies of work, new modes and ways of working, and new resources, devices and tools of work also re-encourage or drive the use of digital technologies and DT (DeSanctis & Poole, 1994). Meanwhile, the literature does not show that introducing new rules, policies, and resources can potentially drive interest in using DT (Ko et al., 2021). New resources and policies introduced after the technology push further encourage its use (Ko et al., 2021). The new modes of working, like from home or virtually from anywhere and at any time, from any device, due to the introduction of mobile computing, cloud computing and virtual communication systems, have enhanced DT of SMEs, particularly during COVID-19 (Indriastuti & Fuad, 2020; Priyono et al., 2020). The finding involving new rules and resources as DT drivers is novel in literature. The typology of Drivers of DT of SMEs is presented in Table 6.3.

The discussions relating to the DT drivers so far reflect the following findings:

**Findings 2: Drivers of DT of SMEs**

Finding 2a: *The significant drivers of DT of SMEs in DCs are of six dimensions, namely: technological features, external environment, internal system, work tasks, emergent outputs, and new rules and resources.*

Finding 2b: *The technological features are classified as dynamic, steady and spirit features, and this classification is novel in literature.*

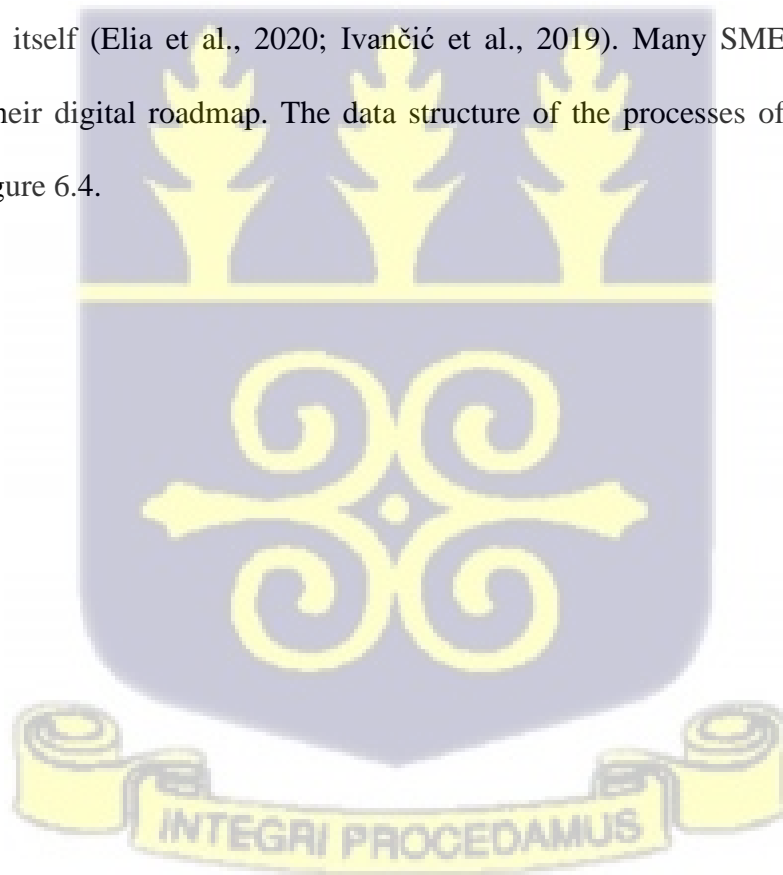
Finding 2c: *The work tasks, the emergent outputs and the new rules and resources are new typologies hitherto absent in the literature.*

**Table 6.3 Typology of Drivers of DT of SMEs**

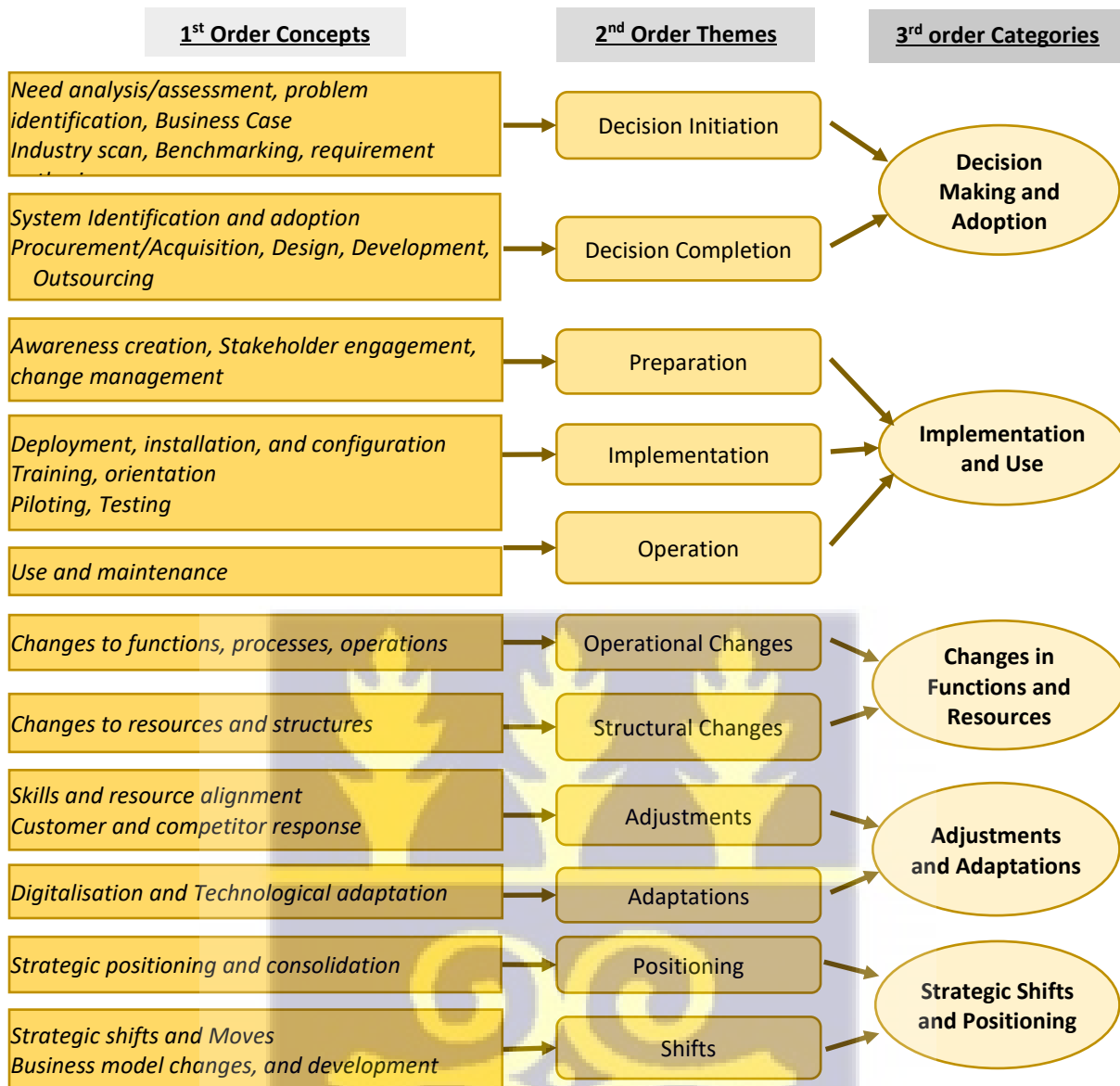
<u>Main Factors</u>	<u>Sub Factors</u>	<u>References</u>
<b>Technological features</b>	Dynamic Features	Châlons & Dufft (2017; Hrustek et al. (2019; Ismail et al. (2017; Liere-Netheler et al. (2018; Al Maamari & Bhuiyan (2021; Dehnert (2020; Hrustek et al. (2019
	Steady Features	
	Spirit Features	
<b>External environment</b>	Competition	Chandra et al. (2020 Helbing (2019; Haffke et al. (2017; Zaki (2019
	Partnerships (Customer and Stakeholder)	
	<i>External Controls</i>	
<b>Internal System</b>	Management Abilities	Cortellazzo et al. (2019; Castagna et al. (2020; Gomes et al. (2020; Pihir et al. (2019
	Organisational Resources	
	Image and Values	
<b>Work Tasks</b>	Task Content	Morakanyane et al. (2017; Parida et al. (2019; Suwandi et al. (2020
	Task Output	
<b>Emergent outputs</b>	Value and Cost related	Mahmood et al. (2019; Nambisan et al. (2019; Osmundsen et al. (2018
	Organisation related	
	Task-Related	
<b>New Rules and Resources</b>	New Rules	Indriastuti & Fuad (2020; Ko et al. (2021; Priyono et al. (2020
	New Resources	

### 6.3.2 Processes of DT of SMEs in DCs

As presented in Section 5.3.2, the findings show five significant dimensions of processes that make up the DT processes of SMEs in DCs. The processes are decision-making and adoption, implementation and use, changes in function and resources, adjustment and adaptation, and strategic shifts and positioning, as shown in Table 5.4. Meanwhile, these five stepwise processes collectively have no equivalent precedence in literature. On the other hand, many scholars have different observations regarding the nature and number of stages or processes organisations undergo in DT (e.g., Berghaus & Back, 2016; Hönigsberg & Dinter, 2019; Vial, 2019). A typical example involves the examination of the digital positioning, formulation of procedures, and orientation processes necessary to implement the DT agenda, then the implementation itself (Elia et al., 2020; Ivančić et al., 2019). Many SMEs follow generic processes for their digital roadmap. The data structure of the processes of DT of SMEs is presented in Figure 6.4.



**Figure 6.4 Data Structure of Processes of DT of SMEs**



Note. Source: Researcher's Constructs

The findings show that the DT processes begin with decision-making and adoption. These processes begin with need analysis, industry scan and benchmarking, acquisition, outsourcing or development, and adoption (Dyczkowska & Dyczkowski, 2018). Several pieces of literature confirm the decision-making activities of DT (e.g., Berghaus & Back, 2016; Delgado, 2017; Hönigsberg & Dinter, 2019; Vial, 2019). Once decision-making is completed, the preparatory activities begin with awareness creation, stakeholder consultation, and change management

(Cuesta et al., 2015). These first processes in DT are essential and, in most cases, determine the success or otherwise of firms' DT adventure (Solis, 2019). Barrane et al. (2020) state that stakeholder consultation and engagement legitimise the DT process. Support from firms' internal and external stakeholders helps advance the course of DT, and orientation and staff engagement are indispensable for most SMEs embarking on DT (Delgado, 2017). The findings suggest two approaches at this stage, decision initiation and completion.

The second stage of the DT of SMEs in DCs is the implementation and use stage, which involves preparation with engagements and change management, and then deployment and configuration of digital systems (Verhoef et al., 2021). It also involves pilot testing, training, and orientation (Barann et al., 2019; Berghaus & Back, 2016). Meanwhile, the orientation and initial skills census is critical. According to Baporikar and Shikokola (2020), the lack of technical skills or its non-existence or weakness among SMEs in DCs affects open innovation (Baporikar & Shikokola, 2020). However, SMEs can rely on external knowledge to broaden their technical competencies, which has cost implications. So, the best approach is to build internal stakeholders' and employees' skills and competencies through orientation and training (Paavola et al., 2017; Verhoef et al., 2021). However, this is not the generic process for all SMEs, as some move on to digitalisation with minimal competence, no orientation and no capacity development (Delgado, 2017).

The fundamental feature of DT begins to emerge in the third stage of DT, which involves changes in functions and resources of the SME. At this stage, digital technology use changes the SMEs' functions, processes, operations, resources, and structures. As captured in the OECD (2019) definition of DT, the DT's specific outcomes are the changes those digital technologies induce in a firm. Most of the literature acknowledges changes to functions and resources as

part of the processes in DT (e.g., Berghaus & Back, 2016; Cuesta et al., 2015; Hönigsberg & Dinter, 2019; Kane et al., 2017). These changes reflect the firm's transformation, where skills and resource gaps manifest (Berghaus & Back, 2016). With these gaps, new skills and resources replace obsolete ones. From the findings, there are two types of changes, which are operational and structural, yet these are not specified in extant literature. The *operational* implies changes in functions and core activities of the firm, while *structural* refers to changes in the structures and resources of the firm.

The changes to the SMEs' functions and resources lead to the fourth stage of DT, which involves adjustment and adaptation (Hemerling et al., 2018). The fundamental processes that SMEs in DCs undertake at this stage of DT include skills and resource alignment to bridge the skills and resource gaps created by the changes (Hönigsberg & Dinter, 2019). Firms then adapt to, use, and maintain the implemented digital technologies (Hansen et al., 2011), involving the personnel and the entire organisation. SME owners or managers at this stage begin to realise that digital technologies no longer play a supporting function; but become an integral part of the firms' operation and innovation (Ulas, 2019; Yli-Huumo & Smolander, 2017). Moreover, the need to react to new competition, find digital partners, adapt to the technologies, propose a value, and optimise capabilities is appreciated (Cuesta et al., 2015; Hönigsberg & Dinter, 2019).

This realisation leads to the final and ultimate stage, which involves strategic shifts and positioning to reflect the firm's new image and business model as a digitally transformed SME (Barann et al., 2019). At this stage, product development, value creation, customer service and revenue-generating functions are all reshaped to reflect and take advantage of DT opportunities (Galindo-Martín et al., 2019). Meanwhile, if maladjustment occurs, there could be a market

exit and digitalisation failure (Mahmood et al., 2019). Other authors, however, delineate different maturity process levels of increasing significance, which represent the digitalisation and the strategic positioning state or level of DT in an organisation (e.g., Berghaus & Back, 2016; Berman & Bell, 2011; Delgado, 2017; Dixon et al., 2010; Kane et al., 2017; Paavola et al., 2017).

Based on the observations above, the understanding of DT is that generic formal, and informal DT processes occur in organisations pursuing DT. Although primarily, SMEs follow similar processes, activities and stages in DT as determined by their internal processes, resources, and capabilities, and there is no such standardised sequence of processes in literature. Therefore, the five processes delineated in this study represent the possible varied sequential processes in the DT of SMEs in DCs. The typology of Processes of DT of SMEs is presented in Table 6.4.

The discourse regarding the DT processes so far indicates the following findings:

**Findings 3: Processes of DT of SMEs**

Finding 3a: *The major processes required for the DT of SMEs in DCs, have five sequential dimensions, namely: decision-making and adoption, implementation and use, changes in function and resources, adjustment and adaptation, and strategic shifts and positioning.*

Finding 3b: *These five stepwise and sequential DT processes, from decision-making to strategic direction, collectively have no equivalent precedence in literature. Though application may vary in practice, the sequential nature is being advocated as an adaptable guide.*

Finding 3c: *The changes in function and resources are of two types: operational and structural.*

**Table 6.4** *Typology of Processes of DT of SMEs*

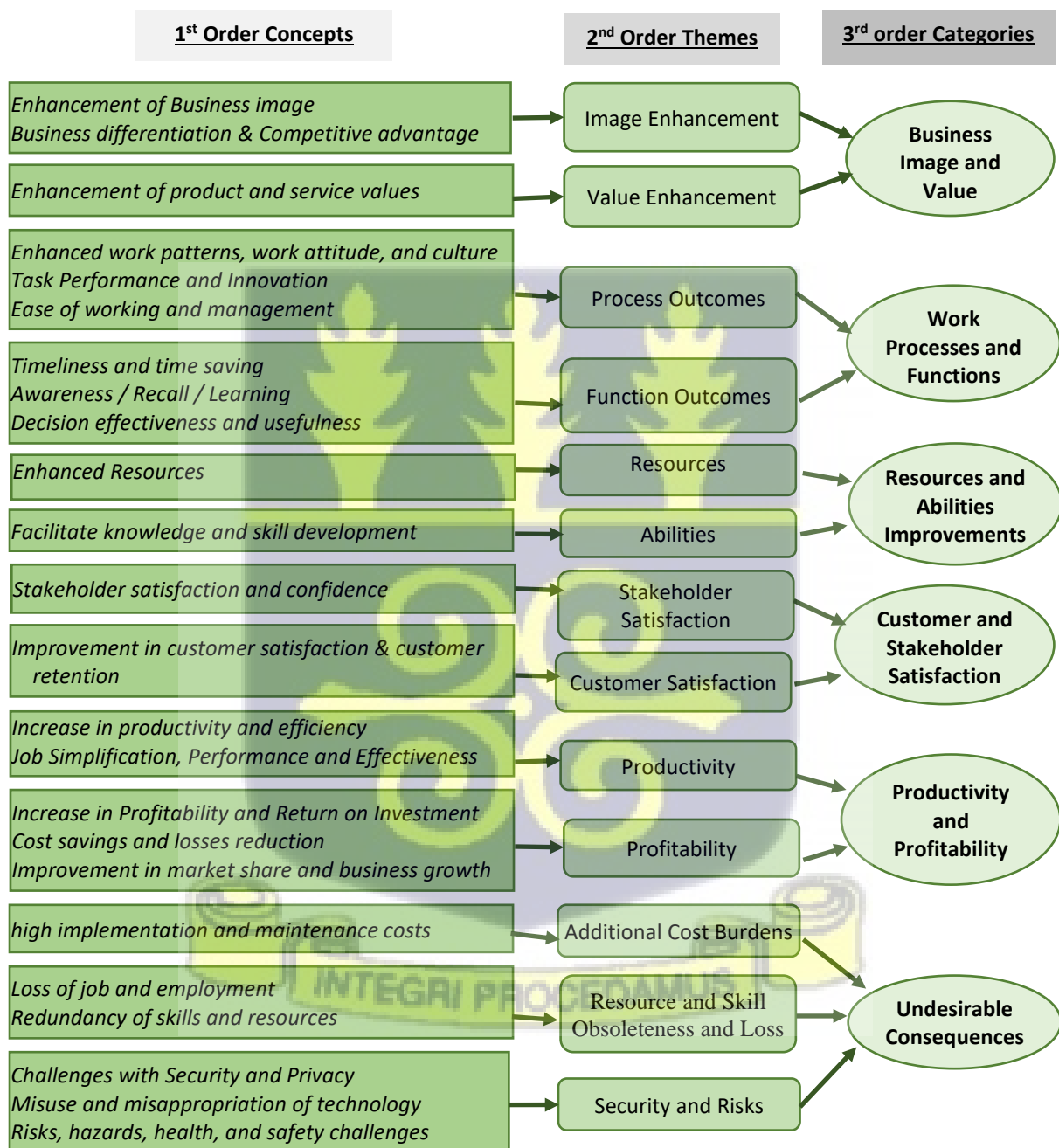
<b><u>Main Factors</u></b>	<b><u>Sub Factors</u></b>	<b><u>References</u></b>
<b>Decision-making and Adoption</b>	Decision initiation	Dyczkowska & Dyczkowski (2018; Hönigsberg & Dinter (2019; Vial (2019
	Decision completion	
<b>Implementation and Use</b>	Preparation	Baporikar & Shikokola (2020; Barann et al. (2019; Berghaus & Back (2016; Verhoef et al. (2021
	Implementation	
	Operation	
<b>Changes in function and resources</b>	Operational Change	Berghaus & Back (2016; Hönigsberg & Dinter (2019
	Structural changes	
<b>Adjustment and Adaptation</b>	Adjustments	Hönigsberg & Dinter (2019; Hemerling et al. (2018; Yli-Huumo & Smolander (2017
	Adaptations	
<b>Strategic Shifts and Positioning</b>	Positioning	Barann et al. (2019; Galindo-Martín et al. (2019; Mahmood et al. (2019
	Shifts	

### 6.3.3 Outcomes of DT of SMEs in DCs

As presented in Section 5.3.3, the findings show six significant outcome dimensions that make-up SMEs' DT outcomes in DCs. The outcomes obtained from the study included business image and value, work processes and functions, resource and skills improvements, customer and stakeholder satisfaction, productivity and profitability, and undesirable consequences. Meanwhile, these DT outcomes represent all the possible dimensions of outcomes in literature (Bui, 2021; Chen et al., 2016; Lukonga, 2020; Mahmood et al., 2019; Mubarak et al., 2019; Verina & Titko, 2019). Moreover, the established outcomes from the study compare with the observation of Mahmood et al. (2019) regarding the DT of SMEs. Mahmood et al. (2019) reiterate that SMEs in DCs are motivated and driven into DT because of the promised improvement in production and time savings, resulting in cost reduction and profitability.

Moreover, the identified outcomes agree with the impact types expressed by Pousttchi et al. (2019): process alignment, personnel, exploitation of data, networks, business development, product development, customer behaviour, and customer relations channel management and marketing. The data structure of the outcomes of DT of SMEs is presented in Figure 6.5.

**Figure 6.5 Data Structure of Outcomes of DT of SMEs**



Note. Source: Researcher's Constructs

The business image and value outcomes relate to enhancing the business image, differentiation, product, and service values (Verina & Titko, 2019). Moreover, value creation and changes in the business model are considered essential and fundamental outcomes in DT, as changes are always anticipated (Bui, 2021; Galindo-Martín et al., 2019; Mahmood et al., 2019). Value and image are appreciated externally; hence competitiveness and competitive advantages contribute to business value (Mahmood et al., 2019; Nadeem et al., 2018; Vial, 2019). Meanwhile, the experts emphasised the competitive advantage, making it well supported by the literature. However, image and value outcomes are known to reshape strategy and, for that matter, influence strategic drive (Rassool & Dissanayake, 2019; Yousaf et al., 2021), but the findings did not relate to strategy.

The work process and function outcomes relate to work patterns, attitude and culture, ease of work and task performance, which are seen as process outcomes and decision effectiveness. In contrast, usefulness, timeliness, and recall are considered functional outcomes. Some literature acknowledges changes in work life and design (e.g., Mahraz et al., 2019; Wang et al., 2018; Schwarzmüller et al., 2018) and, for that matter, conform with the findings. Meanwhile, while the findings are silent on data improvement, others indicate the alignment of processes and data improvement (Bui, 2021; Pousttchi et al., 2019). Bui (2021), on the other hand, highlights the work process benefits implied in the findings.

Resources and abilities improvements encompass job simplification, performance and effectiveness and enhanced resources while facilitating knowledge and skill development (Bui, 2021; Pousttchi et al., 2019; Schwarzmüller et al., 2018). These findings are in tandem with the outcomes proposed by Pousttchi et al. (2019), including skills development, process alignment, and business development. The positive outcomes of DT on most SMEs involve

reducing staffing needs while enhancing employees' capacity, competency, skills, and productivity (Berman & Bell, 2011; Schwarzmüller et al., 2018). These are represented in the findings. Also, the findings of internal outcomes of changes in structure, leadership styles, communications collaborations, knowledge, competencies, and skills are reflected in extant literature (e.g., Bui, 2021; Schwarzmüller et al., 2018; Wang et al., 2018).

Customer and stakeholder satisfaction outcomes involve stakeholder satisfaction, customer satisfaction, confidence and retention. These also reflected the impact types of Pousttchi et al. (2019). Mahmood et al. (2019) further mention business relationships, enhancing customer experience, engagement, and loyalty, while other authors (Galindo-Martín et al., 2019; Mahmood et al., 2019; Morakanyane et al., 2017; Pousttchi et al., 2019) emphasise customer relations and behaviour which are like the findings of the study. Furthermore, stakeholder satisfaction, networking, and collaboration are identified as outcomes that agree with the literature (e.g., Piccinini et al., 2015; Schwarzmüller et al., 2018; Schwertner, 2017; Vial, 2019).

The productivity and profitability outcomes involve cost reduction, improved efficiency, increased sales and return on investment, and increased market share and growth. Meanwhile, the improved effects on organisational performance are acknowledged in literature (e.g., Morakanyane et al., 2017; Schwarzmüller et al., 2018; Chen et al., 2016; Mubarak et al., 2019). Moreover, operational efficiency is also recognised (Bui, 2021; Wang et al., 2018; Rassool & Dissanayake, 2019; Yousaf et al., 2021). Furthermore, operational efficiency and organisational performance outcomes reflect productivity and profitability, as confirmed by Liere-Netheler et al. (2018) and Vial (2019). Moreover, high revenues are also highlighted as outcomes in literature (Galindo-Martín et al., 2019; Reddy & Reinartz, 2017) and are often associated with cost savings and reductions (Mahmood et al., 2019; Nadeem et al., 2018;

Nwankpa & Roumani, 2016). Therefore, the profitability and productivity outcomes are significant for SMEs in DCs (Bui, 2019; Chen et al., 2016; Yousif et al., 2021). These observations align with Lukonga's (2020) conclusion that DT outcomes for many SMEs in DCs are net positive.

Other outcomes identified were described as undesirable consequences. These included additional cost burdens through implementation and maintenance, loss of job and employment, redundancy of skills and resources, challenges with security and privacy, misuse and misappropriation of technology, risks, hazards, health, and safety challenges. These outcomes are negative, showing that despite the well-known positive outcomes of DT for SMEs, adverse outcomes also occur. Extant literature primarily focuses on the positive outcomes of DT, as a net benefit and net impact become the objective (Galindo-Martín et al., 2019; Mahmood et al., 2019; Reddy & Reinartz, 2017).

In reviewing the challenges of DT, Mahmood et al. (2019) considered factors that negatively affect the successful implementation of DT and not the adverse outcomes. They highlighted DT's net benefits and impact in the review (Mahmood et al., 2019). Meanwhile, literature widely discusses security threats like cyber security (Schwarz Müller et al., 2018; Vial, 2019). However, the issues are not considered digitalisation outcomes but threats to digitalisation. Skills and job loss, redundancy, and resource obsolescence are also less discussed in the literature as outcomes (Lukonga, 2020). The strategic shifts and positioning could also result in undesirable outcomes, as maladjustments and disruptions can result in a market exit.

Meanwhile, changes in business models, organisational capacity, and significant strategic shifts caused by DT could be adverse outcomes (Lukonga, 2020). Therefore, reviewing undesirable

outcomes can help firms minimise their adverse effects. The outcomes of DT are often based on the SMEs' judgement of how it contributes to productivity, revenue, customers service, suppliers, employees, organisations, markets, industries, economies, and societies, either negatively or positively (Hanelt et al., 2021; Lukonga, 2020; Schwarzmüller et al., 2018). The outcomes of the DT also depend on the resources, competencies, circumstances, and environment of the SMEs (Ambrosini & Altintas, 2019). Hence, not all SMEs benefit from DT's positive outcomes, and not all SMEs face all the negative outcomes of DT, as outlined in Table 5.5.

Hence, success in DT implementation also indicates the kind of outcomes for SMEs. The poorly selected and implemented DT results in adverse outcomes such as higher cost, misuse and misappropriation of technology, risks, hazards, health and safety challenges, and redundancy of skills and resources (Lukonga, 2020; Mahmood et al., 2019). If appropriately selected based on SMEs' needs and well-implemented, positive outcomes of DTs, such as effective and efficient operations, cost reductions, productivity and profitability, are achieved (Lukonga, 2020). Therefore, the emphasis on the undesirable consequences as part of the study's findings and the usual positive outcomes is novel. The typology of outcomes of DT of SMEs is presented in Table 6.5.

The discussion of the outcomes of DT so far designates the following findings:

**Findings 4: Outcomes of DT of SMEs**

*Finding 4a: The key outcomes of DT of SMEs in DCs have six dimensions, namely: business image and value, work processes and functions, resources and abilities improvements, customer and stakeholder satisfaction, productivity and profitability, and undesirable consequences of technology use.*

*Finding 4b: These six dimensions of DT outcomes represent all the possible dimensions of DT outcomes in the literature.*

*Finding 4c: Most DT outcomes have positive effects (the first five dimensions). However, some outcomes have adverse effects (the sixth dimension) involving additional cost burdens, resource and skills obsolescence and loss, and security and risks.*

**Table 6.5 Typology of Outcomes of DT of SMEs**

<u>Main Factors</u>	<u>Sub Factors</u>	<u>References</u>
<b>Business Image and Value</b>	Image enhancement	Bui (2021; Galindo-Martín et al. (2019; Mahmood et al. (2019; Verina & Titko (2019; Yousaf et al. (2021
	Value enhancement	
<b>Work Processes and Functions</b>	Process outcomes	Mahraz et al. (2019; Pousttchi et al. (2019; Schwarzmüller et al. (2018; Wang et al. (2018
	Function outcomes	
<b>Resources and Abilities Improvements</b>	Resources	Berman & Bell (2011; Bui (2021; Pousttchi et al. (2019; Schwarzmüller et al. (2018
	Abilities	
<b>Customer and Stakeholder Satisfaction</b>	Stakeholder satisfaction	Galindo-Martín et al. (2019; Mahmood et al. (2019; Morakanyane et al. (2017; Pousttchi et al. (2019
	Customer satisfaction	
<b>Productivity and Profitability</b>	Productivity	Morakanyane et al. (2017; Schwarzmüller et al. (2018; Chen et al. (2016; Mubarak et al. (2019)
	Profitability	
<b>Undesirable Consequences</b>	Additional cost burdens	Galindo-Martín et al. (2019; Mahmood et al. (2019; Reddy & Reinartz (2017; Lukonga (2020
	Resource and Skill obsolescence and loss	
	Security and Risk issues	

## 6.4 Influences of the Drivers, Processes, and Outcomes of DT of SMEs

Findings concerning the influences among the drivers, processes, and outcomes presented in Section 5.4 respond to the second research objective. The findings also meet the need to discover the possible relationships and influences among drivers, processes, and outcomes. This gap is essential because there is inadequate literature on the influences among the drivers, the processes, and the outcomes, which calls for research in that direction (Hrustek et al., 2019;

Li, 2020; Liere-Netheler et al., 2018). The study's findings show that drivers influence processes and outcomes, while processes influence the outcomes, and the outcomes influence the drivers. The following subsections discuss the specific influences.

#### **6.4.1 Influence of Drivers on the Processes of DT of SMEs**

As illustrated in Table 5.6, the findings of this study show that distinct dimensions of DT drivers affect different dimensions of processes, and specific drivers directly influence particular DT processes. At the level of the dimensions, 15 unique influences are observed between the six drivers and five processes. However, there is a lack of literature that relates to or shows the influence of DT drivers on the processes (e.g., Hrustek et al., 2019; Indriastuti & Fuad, 2020; Reis et al., 2018, Liere-Netheler et al., 2018; Osmundsen et al., 2018; Parida et al., 2019).

The digital technology drivers' structural features influence decision-making and adoption, implementation and use, and adjustment and adaptation stages (Al Maamari & Bhuiyan, 2021). Meanwhile, the spirit features, on the other hand, influence only the processes of implementation and use (Alraja et al., 2021). However, the external environment as a driver influences the processes of decision-making and adoption, changes in function and resources, and adjustment and adaptation (Chatterjee et al., 2021). Moreover, Delgado (2017) confirms that external factors such as technological advances, customer expectations, and competitors' business models determine the nature of processes a firm needs to pursue to achieve DT. Furthermore, COVID-19 and its associated restrictions, particularly external drivers, influence the changes in functions and resources (Indriastuti & Fuad, 2020).

The internal system drivers influence the decision-making and adoption, changes in function and resources, adjustment and adaptation, and strategic shifts and positioning (Chatterjee et al., 2021). The work task as a driver influences the changes in function processes only (Gomes et al., 2020). As drivers, the emergent output of technology and organisation interaction influences changes in function and resources, strategic shifts and positioning (Berghaus & Back, 2017; Isaksson & Hylving, 2017). Finally, new rules and resources as drivers influence the changes in function and resources only (DeSanctis & Poole, 1994; Ko et al., 2021). These observed influences suggest that whatever drives and motivates DT somehow determines the processes to follow or emphasise and, eventually, the digitalisation and transformation approach. The typology of the Influence of Drivers on Processes of DT of SMEs is presented in Table 6.6

The discussion on the influences of DT drivers on DT processes suggests the following findings:

**Findings 5: Drivers influence Processes**

Finding 5a: *DT drivers tend to directly influence the DT processes to pursue in the DT of SMEs in DCs.*

Finding 5b: *The influences of the DT drivers on DT processes are not general; rather, different driver dimensions influence distinct process dimensions.*

Example: *Technological features drivers influence the decision-making and adoption, implementation and use, and adjustment and adaptation processes, while work tasks drivers influence the changes in function and resources, processes alone.*

**Table 6.6 Typology of Influence of Drivers on Processes of DT of SMEs**

<b>Main Factors</b>		<b>Sub Factors</b>		<b>References</b>
<b>Influencing Drivers</b>	<b>Influenced Processes</b>	<b>Influencing Drivers</b>	<b>Influenced Processes</b>	Lack of Studies Mainly
Technological features	Adjustment and Adaptation	Dynamic features	Adjustments	Delgado, 2017; Indriastuti & Fuad, 2020; Gomes et al., 2020; Hrustek et al., 2019; Indriastuti & Fuad, 2020; Liere-Netheler et al., 2018; Osmundsen et al., 2018; Parida et al., 2019; Reis et al., 2018,
	Decision-Making and Adoption		Decision completion	
	Implementation and Use	Steady features	Implementation	
External environment	Adjustment and Adaptation	Competition	Adjustments	
		Partnerships	Preparation	
	Decision-Making and Adoption	External Control	Decision completion	
	Changes in Function and Resources		Operational Change	
Internal system	Decision-Making and Adoption	Management abilities	Decision completion	
	Adjustment and Adaptation	Organisational Resources	Adjustments	
	Changes in Function and Resources		Structural changes	
	Strategic Shifts and Positioning	Image and Values	Shifts	
Work tasks	Changes in Function and Resources	Task contents	Operational change	
		Task outputs		
Emergent outputs	Strategic Shifts and Positioning	Value and Cost Related change	Shifts	
	Changes in Function and Resources	Task-related change	Operational Change	
		Organisation related change	Structural changes	
New rules and resources		New resources		
		New Rules	Operational Change	

### 6.4.2 Influence of Drivers on the Outcomes of DT of SMEs

As illustrated in Table 5.7, this study's findings show that distinct DTs drivers result in distinct types of outcomes, and specific drivers directly influence particular outcomes in the DT. At the level of the dimensions, 19 unique influences are observed between the six drivers and the six outcomes. Meanwhile, there is a general lack of studies that examines the interrelationships

between DT drivers and DT outcomes (Hrustek et al., 2019; Liere-Netheler et al., 2018;). However, little literature highlights drivers' effects on business models (Haffke et al., 2017; Hrustek et al., 2019) and success factors (Osmundsen et al., 2018).

Meanwhile, the findings show that the digital technology structural features directly affect the outcomes of work processes and functions, business image and value, and resources and skill improvement. At the same time, the digital technology spirit features as drivers, influence the outcomes of productivity and profitability only (Pousttchi et al., 2019).

On the other hand, the external environmental drivers influence the business image and value, customer and stakeholder satisfaction, work processes and functions, and undesirable consequences that involve security and risk. Meanwhile, it is established that most external drivers for DT work by creating digitalisation pressure through showcasing demonstrable competitive edge with digital advances, disruptive business models and technological progress in the market (Haffke et al., 2017). Moreover, The COVID-19 restrictions as an external driver influence work processes and functions through task performance and innovation. However, internal system drivers affect work processes and functions, resources and abilities improvements, productivity and profitability, and Undesirable consequences relating to resource and skill obsolescence and loss (Pousttchi et al., 2019).

On the other hand, the work task drivers influence the outcomes of resources, skills improvements, and work processes and functions. In comparison, the emergent outputs of technology-organisation interaction as drivers affect productivity and profitability, business image and value, and work processes and functions (Mahmood et al., 2019; Nambisan et al., 2019; Osmundsen et al., 2018; Pousttchi et al., 2019). Finally, the new rules and resources as

a driver influence productivity and profitability and work processes and functions (Indriastuti & Fuad, 2020; Ko et al., 2021; Priyono et al., 2020).

The motivations that push DT are intrinsically linked to DT outcomes and related to the drivers. According to Berghaus and Back (2017), one of the significant motivations for companies and organisations going into DT is the need for organisations to be digital-ready to ensure they achieve the benefits that follow digital technology use. Hrustek et al. (2019) also showed that customer-driven DT might result in commercial models, technology-driven DT may result in the value proposition, and organisational-driven DT may result in the operational model. The typology of the influence of drivers on outcomes of DT of SMEs is presented in Table 6.7.

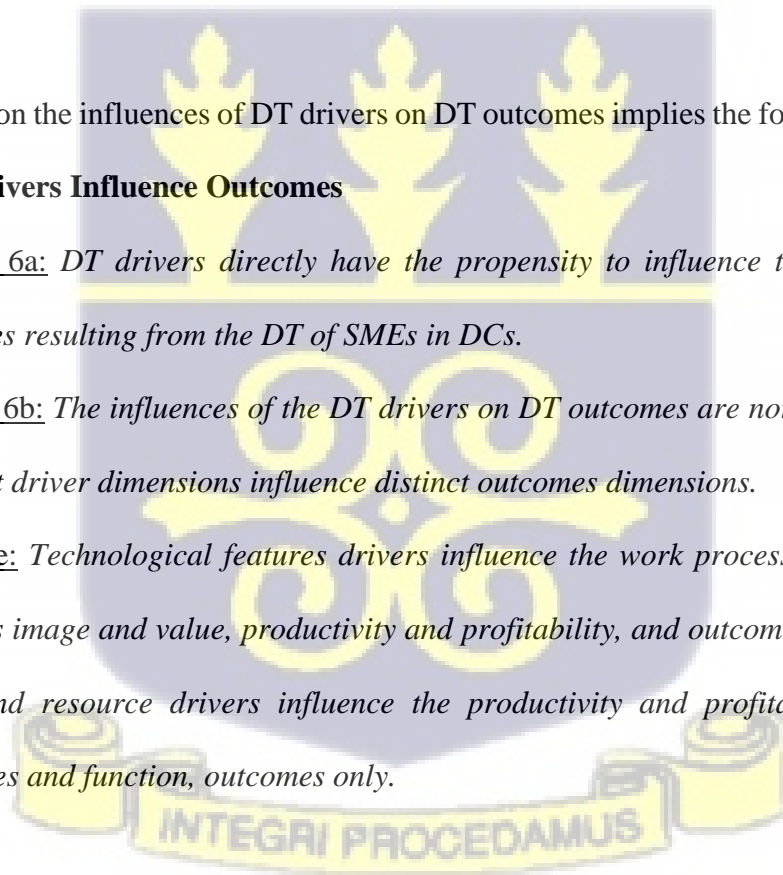
The discussion on the influences of DT drivers on DT outcomes implies the following findings:

**Findings 6: Drivers Influence Outcomes**

Finding 6a: *DT drivers directly have the propensity to influence the nature of DT outcomes resulting from the DT of SMEs in DCs.*

Finding 6b: *The influences of the DT drivers on DT outcomes are not general; rather, different driver dimensions influence distinct outcomes dimensions.*

Example: *Technological features drivers influence the work processes and function, business image and value, productivity and profitability, and outcomes, while the new rules and resource drivers influence the productivity and profitability and work processes and function, outcomes only.*



**Table 6.7 Typology of Influence of Drivers on Outcomes of DT of SMEs**

<b>Main Factors</b>		<b>Sub Factors</b>		<b>References</b>
<b>Influencing Drivers</b>	<b>Influenced Outcomes</b>	<b>Influencing Drivers</b>	<b>Influenced Outcomes</b>	<b>Lack of Studies Mainly</b>
<b>Technological Features</b>	<b>Work processes and function</b>	Dynamic features	Process outcomes	
		Steady features	Function outcomes	
			Process outcomes	
	<b>Business Image and Value</b>	Dynamic features	Image enhancement	
	<b>Productivity and Profitability</b>	Steady features	Productivity	
		Spirit features		
<b>External Environment</b>	<b>Business Image and Value</b>	Competition	Image enhancement	
	<b>Customer and stakeholder Satisfaction</b>	Partnerships	Profitability	
			Customer satisfaction	
			Stakeholder satisfaction	
	<b>Undesirable consequences</b>	External Control	Security and Risk	
<b>Work Processes and Functions</b>	Process outcomes			
<b>Internal System</b>	<b>Work Processes and Functions</b>	Management Abilities	Process outcomes	
		Image and Values		
	<b>Resources and Abilities Improvements</b>	Organisational Resources	Resources	
	<b>Undesirable consequences</b>		Resource and Skill obsolescence and loss	
	<b>Productivity and Profitability</b>	Management Abilities	Productivity	
<b>Work Tasks</b>	<b>Productivity and Profitability</b>	Task outputs	Productivity	
	<b>Work Processes and Functions</b>	Task contents	Process outcomes	
<b>Emergent Outputs</b>	<b>Productivity and Profitability</b>	Value and Cost related change	Profitability	
	<b>Business Image and Value</b>		Image enhancement	
	<b>Work Processes and Functions</b>	Task-related change	Process outcomes	
		Organisation related change	Function outcomes	
<b>New Rules and Resources</b>	<b>Productivity and Profitability</b>	New Resources	Productivity	
	<b>Work processes and Function</b>	New Rules	Process outcomes	

### 6.4.3 Influence of Processes on the Outcomes of DT of SMEs

As illustrated in Table 5.8, the findings of this study show that processes are confirmed to influence the transformation outcomes directly. Li (2020) contended that top enterprises must focus on matching activities to succeed in DT, implying that specific activities or processes would achieve successful outcomes. However, there is a lack of literature on the influence of processes on outcomes. At the level of the dimensions, 15 unique influences are observed between the five processes and the six outcomes. Meanwhile, no study examines the interrelationships between DT processes and outcomes (Liere-Netheler et al., 2018; Hrustek et al., 2019).

The findings also show that the decision-making and adoption processes influence the outcomes of productivity and profitability, customer and stakeholder satisfaction, and business image and value (Hönigsberg & Dinter, 2019; Vial, 2019). Meanwhile, the implementation and use of processes influence resources and abilities improvements, work processes and functions and undesirable consequences regarding security and risks (Verhoef et al., 2021). The changes in functions and resources process affect the work processes and functions improvements, resources and abilities improvements, and the undesirable consequences regarding resource and skill obsolescence and loss (Berghaus & Back, 2016). However, the adjustment and adaptation processes affect resources and abilities improvements, customer and stakeholder satisfaction, productivity and profitability, and undesirable consequences in terms of resource and skill obsolescence and loss and security and risk (Hönigsberg & Dinter, 2019; Pousttchi et al., 2019). Strategic shifts and positioning processes affect business image and value, and productivity and profitability.

Achieving digital maturity is a continuous process that consumes time, yet it helps ensure organisations' survival as the processes and skills across organisations drive new business models that drive value (Kane et al., 2017). Furthermore, optimising DT processes also results in firms' operational efficiency outcomes by providing omni-channels, ensuring agility, improving decision-making, and producing structural changes that enhance business operations (Nadeem et al., 2018; Wang et al., 2018). The typology of the influence of processes on outcomes of DT of SMEs is presented in Table 6.8.

The discussion on the influences of DT processes on DT outcomes implies the following findings:

**Findings 7: Processes Influence Outcomes**

Finding 7a: *DT processes inclined to directly influence the nature of DT outcomes resulting from the DT of SMEs in DCs.*

Finding 7b: *The influences of the DT processes on DT outcomes are not general; rather, different process dimensions influence distinct outcomes dimensions.*

Example: *Decision-making and adoption processes influence productivity and profitability, customer and stakeholder satisfaction, and business image and value outcomes, while strategic shift and positioning processes influence the business image and value and productivity and profitability outcomes.*

**Table 6.8 Typology of Influence of Processes on Outcomes of DT of SMEs**

<u>Main Factors</u>		<u>Sub Factors</u>		<u>References</u>
<b>Influencing Processes</b>	<b>Influenced Outcomes</b>	<b>Influencing Processes</b>	<b>Influenced Outcomes</b>	
<b>Decision-Making and Adoption</b>	<b>Productivity and Profitability</b>	Decision completion	Profitability	Lack of Studies Mainly  Hrustek et al. (2019;
	<b>Customer and stakeholder satisfaction</b>	Preparation	Stakeholder satisfaction	

	<b>Business Image and Value</b>	Decision initiation	Image enhancement	Kane et al. (2017)
<b>Implementation and Use</b>	<b>Resources and Abilities Improvements</b>	Implementation	Abilities	Li (2020)
	<b>Work Processes and Functions</b>	Preparation	Function outcomes	Liere-Netheler et al. (2018);
		Implementation	Process outcomes	
	<b>Undesirable Consequences</b>	Operation	Security and Risk	Nadeem et al. (2018);
<b>Changes in Function and Resources</b>	<b>Work Processes and Functions</b>	Operational Change	Process outcomes	Pousttchi et al. (2019);
	<b>Productivity and Profitability</b>		Productivity	
	<b>Undesirable Consequences</b>	Structural changes	Resource and Skill obsolescence and loss	Wang et al. (2018)
<b>Adjustment and Adaptation</b>	Adjustments		Resources	
			Customer satisfaction	
			Security and Risk	
<b>Productivity and Profitability</b>	Adaptations	Productivity		
<b>Strategic Shifts and Positioning</b>	<b>Business Image and Value</b>	Shifts	Image enhancement	
			Value enhancement	
	<b>Productivity and Profitability</b>		Profitability	

#### 6.4.4 Influence of Outcomes on the Drivers of DT of SMEs

As illustrated in Table 5.9, this study's findings show that distinct DTs' outcomes influence distinct types of drivers, and specific outcomes directly influence drivers in the DT. At the dimensions level 15, unique influences are observed between the six outcomes and the six drivers.

The findings show that the business image and value outcomes (Reinartz et al., 2019; Reis et al., 2018; Vial, 2019; Wang et al., 2018) influence the drivers of the internal system, external environment, and emergent outputs. However, there is a lack of studies that examine the interrelationships between DT drivers and DT outcomes (Liere-Netheler et al., 2018; Hrustek

et al., 2019; Osmundsen et al., 2018; Parida et al., 2019). Meanwhile, developing innovative digital solutions with features suited to improve SMEs' business proficiency and profitability is increasing in DCs and, thus, leading to a technology-push DT in such economies (Chen et al., 2016; Lukonga, 2020; Mubarak et al., 2019). Hence the outputs of innovative technologies are driving DT to achieve profitable outcomes.

Meanwhile, the work process and function outcomes influence the work task and the internal system. The resources and abilities improvement outcomes also influence the work tasks, emergent outputs, and internal system. However, the customer and stakeholder satisfaction outcomes (Galindo-Martín et al., 2019; Mahmood et al., 2019; Morakanyane et al., 2017) influence the external environment. The productivity and profitability outcomes also influence the emergent outputs, new rules and resources, and internal system (Chen et al., 2016; Mubarak et al., 2019; Schwarzmüller et al., 2018).

Finally, the undesirable consequences as negative outputs in terms of high costs, resource and skill obsolescence and loss and Security and Risk issues (Piccinini et al., 2015; Schwarzmüller et al., 2018; Schwertner, 2017; Vial, 2019) influence the emergent outputs, internal system and new rules and resources. The typology of the Influence of processes on outcomes of DT of SMEs is presented in Table 6.9.

The discussion on the influences of DT outcomes on DT drivers indicates the following findings:

**Findings 8: Outcomes influence Drivers**

**Finding 8a:** *DT outcomes can directly influence the DT drivers of the DT of SMEs in DCs.*

*Finding 8b: The influences of the DT outcomes on DT drivers are not general; rather, different outcomes dimensions influence distinct driver dimensions.*

*Example: Work processes and function outcomes influence the work tasks and internal system drivers, while the customer and stakeholder satisfaction outcomes influence the external environment drivers only.*

**Table 6.9 Typology of Influence of Outcomes on Drivers of DT of SMEs**

<u>Main Factors</u>		<u>Sub Factors</u>		<u>References</u>
<b>Influencing Outcomes</b>	<b>Influenced Drivers</b>	<b>Influencing Outcomes</b>	<b>Influenced Drivers</b>	Lack of Studies Mainly
<b>Business Image and Value</b>	<b>Internal System</b>	Image enhancement	Image and Values	Galindo-Martín et al. (2019);
	<b>External environment</b>		Competition	
	<b>Emergent Outputs</b>	Value enhancement	Value and Cost related change	Hrustek et al. (2019);
<b>Work Processes and Functions</b>	<b>Work Tasks</b>	Process outcomes	Task contents	Liere-Netheler et al. (2018);
			Task outputs	
	<b>Internal System</b>	Function outcomes	Management Abilities	Mahmood et al. (2019);
<b>Resources and Abilities Improvements</b>	<b>Work Tasks</b>	Productivity	Task contents	Morakanyane et al. (2017)
			Tasks outputs	
	<b>Emergent Outputs</b>	Resources	Value and Cost related change	Osmundsen et al. (2018);
	<b>Internal System</b>		Organisational Resources	
			Abilities	
<b>Customer and Stakeholder Satisfaction</b>	<b>External environment</b>	Stakeholder satisfaction	Partnerships	Piccinini et al. (2015);
		Customer satisfaction		
<b>Productivity and Profitability</b>	<b>Emergent Outputs</b>	Productivity	Value and Cost related change	Reinartz et al. (2019);
	<b>New Rules and Resources</b>		New Resources	Reis et al. (2018);
	<b>Internal System</b>	Profitability	Image and Values	Schwarz Müller et al. (2018);
		Organisational Resources		
<b>Undesirable consequences</b>	<b>Emergent Outputs</b>	Additional cost burdens	Value and Cost related change	Schwertner (2017);
		Resource and Skill obsolescence and loss	Task-related	
				Organisation related change

			Task-related change	Wang et al. (2018)
	<b>Internal System</b>		Organisational Resources	
	<b>New Rules and Resources</b>	Security and Risk issues	New Rules	
	<b>Emergent Outputs</b>		Organisation related change	

## 6.5 SMEs capabilities and capacities influence on DT Factors

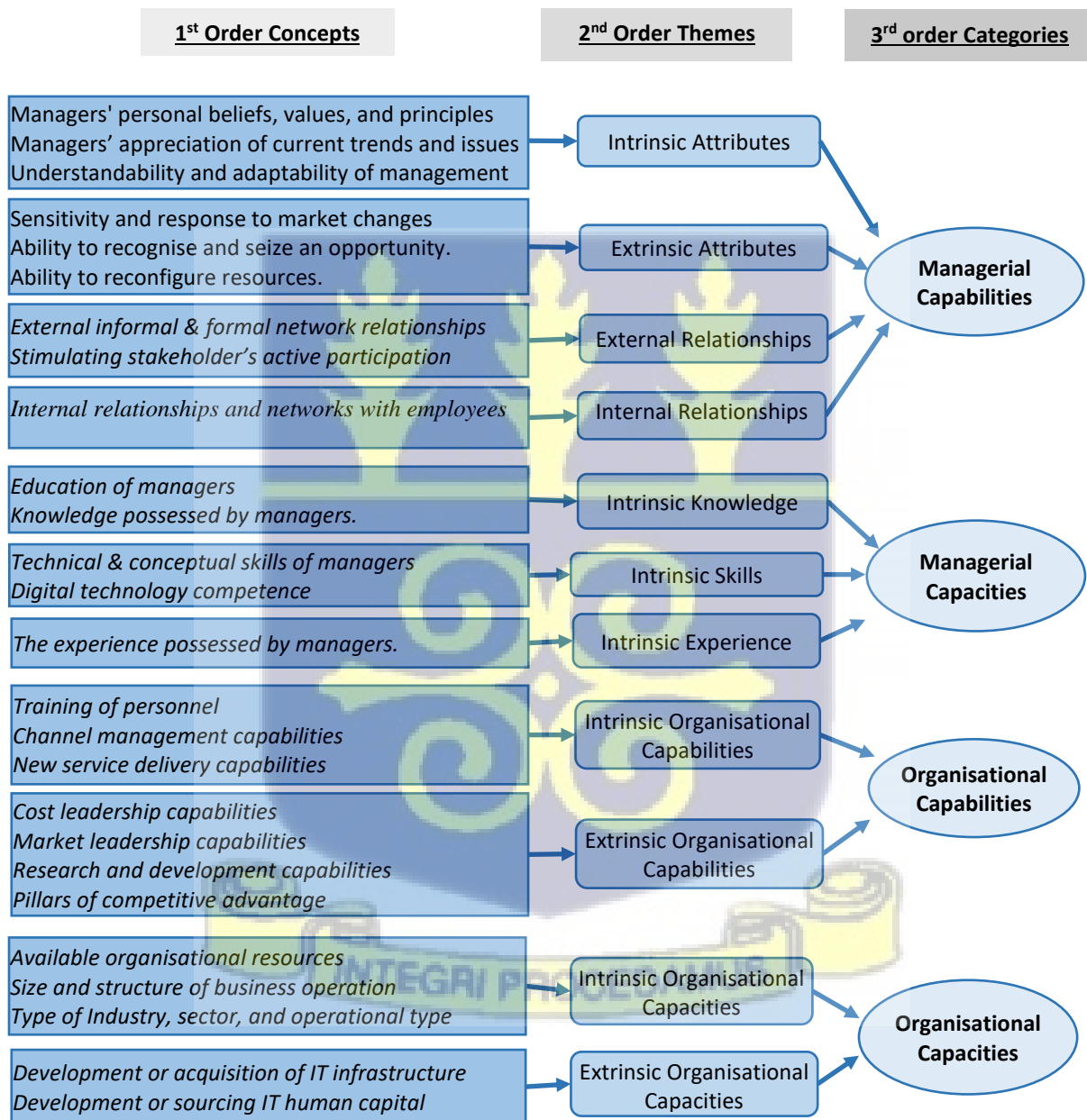
Findings concerning the capabilities and capacities' influence on DT respond to the third objective of investigating the influence of SMEs capabilities and capacities on the drivers, processes, and outcomes of DT in DCs. The findings also meet the need to link SMEs capabilities and capacities to DT. This gap is essential because there is inadequate literature on the effects of capabilities and capacities on DT (Hanelt et al., 2021; Vial, 2019; Helfat & Martin, 2015; Helfat & Winter, 2011; Li et al., 2018; Savastano et al., 2019). In this study, direct influences are observed between the capabilities and capacities, and the drivers, the processes, and the outcomes. Moreover, SMEs' successful accomplishment of DT relies on how they use their capabilities and capacities to drive the DT and pursue the transformation processes (Baporikar & Shikokola, 2020; Taruté et al., 2018). The following subsections consider the discussions on the SMEs capabilities and capacities and their specific influences on the drivers, processes, and outcomes.

### 6.5.1 SMEs Capabilities and Capacities in DT

As presented in Section 5.5.1, the findings show four significant dimensions of capabilities and capacities that comprise the SMEs capabilities and capacities of DT in DCs. These four dimensions are managerial capabilities, managerial capacities, organisational capabilities, and organisational capacities. De la Boutetière et al. (2018) noted that whether a DT agenda

succeeds depends on the management capabilities and the organisational resources, capacity, and capabilities. Thus, managerial, and organisational capacity and capabilities are indispensable in ensuring DT's success (Weritz et al., 2020). The data structure of the SMEs capabilities and capacities in DT of DCs is presented in Figure 6.6.

**Figure 6.6 Data Structure of SMEs Capabilities and Capacities in DT of DCs**



Note. Source: Researcher's Constructs

This study shows that managerial capabilities manifest in two approaches of cognition and social capital, while the managerial capacities reflect human capital, which constitutes the dynamic managerial capabilities concept (Adner & Helfat, 2003; Ambrosini & Altintas, 2019; Helfat & Martin, 2015). The study found that managerial cognition exhibits two attributes as intrinsic and extrinsic. The extrinsic attributes are sensitivity, response to market changes, and the ability to recognise and seize opportunities and reconfigure resources (Zhou et al., 2019). On the contrary, intrinsic attributes relate to understanding, managers' personal beliefs and principles, and appreciation of changing trends. Meanwhile, managerial cognition is a major driving force for organisational innovation (Yang et al., 2019).

On the other hand, managerial social capital is related to internal and external relationships (both formal and informal), manifesting in employee and stakeholder networking, social networks, and connections (Cannas, 2021). Managerial human capital is related to intrinsic competencies, knowledge, skills, and experience (Helfat & Martin, 2015). According to Nadkarni and Prügl (2020), DT requires new skills and competence to implement and manage digital technologies and strategies to commoditise services. Developing these new competencies requires agile, people-oriented, innovative, customer-centric management approaches (Morakanyane et al., 2017; Pousttchi et al., 2019). Such approaches can streamline and leverage digital technology opportunities to change the status quo and tap into new businesses, products, and services involving DT (Nadkarni & Prügl, 2020). Hence management must develop the competencies required for the new dawn of business management and processes for success in DT (Cannas, 2021).

Another influence of DT results from the organisational capabilities and capacities identified in the study. The study's organisational capabilities and capacities refer to tangible and

intangible resources and the firm's existing abilities (Heider et al., 2020). The nature of the firm's resources and endowment level determine its ability to perform reasonably and at least in a minimally satisfactory manner (Helfat & Winter, 2011). DT requires some number of organisational capabilities and capacities to implement. These cover tangible resources, such as capital to purchase digital technology infrastructure and intangible resources, such as the needed competencies and skills to implement and manage DT (Weritz et al., 2020).

The organisational capabilities and capacities determine how well SMEs implement and manage DT (Weritz et al., 2020). Based on this study's outcome, how SMEs in DCs build their organisational capital, and DT capacity includes training personnel, developing, or acquiring IT infrastructure, and research and development (Helfat & Winter, 2011). Other organisational capabilities and capacities constraints on SMEs' DT observed in the study include the size and structure of business operation, industry, sector, operation type; pillars of competitive advantage; and new service delivery capabilities (Li et al., 2018; Wu et al., 2021). Meanwhile, Heider et al. (2020) virtually confirm this observation by noting that organisational capabilities and capacities may differ based on the size and structure of business operation, industry, sector, and operation type. The study's analysis and findings from the experts' responses reveal that the SMEs capabilities and capacities influenced the DT drivers, processes, and outcomes. The typology of capabilities and capacities of SMEs is presented in Table 6.10.

The discussion on the SMEs capabilities and capacities indicates the following findings:

**Findings 9: Capabilities and Capacities**

*Finding 9a: The capabilities and capacities of SMEs involved in DT are of four dimensions, namely: managerial capabilities, managerial capacities, organisational capabilities, and organisational capacities.*

Finding 9b: *the capabilities and capacities for both the managerial and organisational dimensions can be classified as either intrinsic or extrinsic.*

Finding 9c: *the managerial capabilities are of four types of intrinsic attributes, extrinsic attributes, extrinsic relationships, and intrinsic relationships, and this classification is hitherto non-existent in literature.*

**Table 6.10** *Typology of Capabilities and Capacities of SMEs*

<u>Main Factors</u>	<u>Sub Factors</u>	<u>References</u>
<b>Managerial Capabilities</b>	<i>Intrinsic Attributes</i>	Adner & Helfat (2003; Ambrosini & Altintas (2019);
	<i>Extrinsic Attributes</i>	
	<i>Extrinsic Relationships</i>	
	<i>Intrinsic Relationships</i>	
<b>Managerial Capacities</b>	<i>Intrinsic Knowledge</i>	De la Boutetière et al. (2018) Heider et al. (2020) Helfat & Martin (2015)
	<i>Intrinsic Skills</i>	
	<i>Intrinsic Experience</i>	
<b>Organisational Capabilities</b>	<i>Intrinsic Organisational Capabilities</i>	Nadkarni & Prügl (2020) Weritz et al. (2020)
	<i>Extrinsic Organisational Capabilities</i>	
<b>Organisational Capacities</b>	<i>Intrinsic Organisational Capacities</i>	Yang et al. (2019)
	<i>Extrinsic Organisational Capacities</i>	

### 6.5.2 SMEs Capabilities and Capacities influence on DT Drivers

As illustrated in Table 5.11, the findings of this study show that the SMEs capabilities and capacities influence the DT drivers. The exposure of the SMEs capabilities and capacities is significant for factors that drive DT. Meanwhile, capabilities and capacities can influence DT drivers; therefore, the drivers' influence cannot be overlooked, particularly in SMEs in DCs (Morakanyane, 2017). Broadly expressed, the managerial capabilities dimension influences the drivers for DT, including the internal system, the external environment, the emergent outputs, and new rules and resources (Kumbure et al., 2020; Viglia et al., 2018). Meanwhile, managerial

capacity influences the drivers of internal systems and new rules and resources (Bleady et al., 2018; Helfat & Martin, 2015).

On the other hand, the study also shows that SMEs' organisational capabilities and capacities influence DT drivers. The organisational capabilities influence the work tasks, internal systems, the external environment, new rules and resources, and drivers. Warner and Wäger (2019) recommended that channel management capabilities become the essential organisational capability to drive the DT agenda resulting from customer demand. Channel management and product and service delivery capabilities, described as *intrinsic*, influence the external environment and work task drivers. Meanwhile, cost leadership, market leadership and pillars of competitive advantage capabilities, described as *extrinsic*, influence the internal system, external environment, and technological features (Wu et al., 2021; Weritz et al., 2020). The *intrinsic* organisational capacities involving the available resources, size and structure influence the internal resources, while the *extrinsic* capabilities of developed or acquired infrastructure or human resources influence both the internal system and work task drivers (Pihir et al., 2019; Weritz et al., 2020; Zhou et al., 2019). The typology of SMEs' capabilities and capacities' influence on drivers of DT is presented in Table 6.11.

The discussion on the SMEs capabilities and capacities' influence on the drivers of DT indicates the following findings:

**Findings 10: Capabilities and Capacities influence Drivers**

**Finding 10a:** *SMEs capabilities and capacities can influence the dimensions of drivers of DT.*

Finding 10b: *The influences of the SMEs capabilities and capacities on DT drivers are not general; rather, different capabilities and capacities dimensions influence distinct driver dimensions.*

Example: *Managerial capabilities influence the internal system and new rules and resource drivers, whereas organisational capacities influence the internal system and work task drivers.*

**Table 6.11 Typology of SMEs Capabilities and Capacities influence on Drivers of DT**

<u>Main Factors</u>		<u>Sub Factors</u>		<u>References</u>	
<b>Influencing Capabilities and Capacities</b>	<b>Influenced Drivers</b>	<b>Influencing Capabilities and Capacities</b>	<b>Influenced Drivers</b>		
<b>Managerial Capabilities</b>	<b>Internal System</b>	<i>Intrinsic Managerial Attributes</i>	Management Abilities	Morakanyane (2017)	
	<b>New Rules and Resources</b>		New Resources		
	<b>Emergent Outputs</b>		New Rules		
	<b>External Environment</b>	<i>Extrinsic Attributes</i>	Organisation Related Change		Kumbure et al. (2020; Viglia et al. (2018)
			Competition		
	<b>Internal System</b>	<i>External Relationships</i>	Partnerships (Customers and Stakeholders)		Bleady et al. (2018;
	<b>Emergent Outputs</b>		Management Abilities		
	<b>External Environment</b>	<i>Internal Relationships</i>	Organisation related Change		Helfat & Martin (2015)
<b>Work Tasks</b>	Competition				
<b>Managerial Capacities</b>	<b>Internal System</b>	<i>Intrinsic Knowledge</i>	Partnerships (Customers and Stakeholders)	Pihir et al. (2019)	
	<b>New Rules and Resources</b>	<i>Intrinsic Skills</i>	Task Output		
<b>Organisational Capabilities</b>	<b>Work Tasks</b>	<i>Intrinsic Organisational Capabilities</i>	Management Abilities	Warner and Wäger (2019)	
	<b>External environment</b>		New Resources		
	<b>Internal System</b>	<i>Extrinsic Organisational Capabilities</i>	Task Output		Weritz et al. (2020;
	<b>External Environment</b>		Partnerships (Customers and Stakeholders)		
			Organisational Resources	Zhou et al. (2019)	
			Partnerships (Customers and Stakeholders)		

	<b>New Rules and Resources</b>		New Resources	
	<b>External Environment</b>		Competition	
<b>Organisational Capacities</b>	<b>Internal System</b>	<i>Intrinsic Organisational Capacities</i>	Organisational Resources	
	<b>Work Tasks</b>	<i>Extrinsic Organisational Capacities</i>	Task Output	

### 6.5.3 SMEs Capabilities and Capacities Influence on DT Processes

As illustrated in Table 5.12, the findings of this study show that the SMEs' capabilities and capacities influence the DT processes. The influence of capabilities and capacities on the DT processes observed in the study reflects some extant literature expectations (Dixon et al., 2010; Kane et al., 2017). The managerial capabilities influence all the dimensions of processes identified, which are decision-making and adoption, implementation and use, changes in functions and resources, adjustments and adaptations, and strategic shifts and positioning (Pihir et al., 2019; Weritz et al., 2020; Wiliandri, 2020; Wu et al., 2021, Zhou et al., 2019). Meanwhile, the managerial capacities influence only the decision-making and adoption, implementation and use, adjustment and adaptation processes dimensions (Dixon et al., 2010; Kane et al., 2017).

On the other hand, the organisational capabilities also influence all the processes dimensions of decision-making and adoption, implementation and use, changes in functions and resources, adjustments and adaptations, and strategic shifts and positioning (Weritz et al., 2020; Zhou et al., 2019). Meanwhile, the organisational capacities, however, influence the changes in functions and resources, adjustments and adaptations, and strategic shifts and positioning (Pihir et al., 2019; Weritz et al., 2020; Zhou et al., 2019). Dixon et al. (2010) contended that feedback loops leading from the dynamic capabilities enable the constant refreshing of the stages of DT

with strategic capability, ensuring survival and sustainable competitive advantage. This contention suggests the influence of capabilities and capacities on DT processes (Dixon et al., 2010; Wiliandri, 2020; Wu et al., 2021).

Kane et al. (2017) have also pointed out that organisations are transformed by capabilities and digital technologies that enhance organisations' processes and skills. Thus, when an organisation intends to undergo DT, it is binding on the managers to obtain the capability necessary to lead the firm through the DT path (Helfat et al., 2009). Also, altering the business operating model by generating new digital capabilities, and incorporating, and optimising all physical and digital elements can affect the organisation's DT processes (Li, 2020).

The discussion on the SMEs capabilities and capacities' influence on DT processes suggests the following findings: The typology of SMEs capabilities and capacities' influence on processes of DT is presented in Table 6.12.

The discussion on the SMEs capabilities and capacities' influence on the processes of DT indicates the following findings:

**Findings 11: Capabilities and Capacities influence Processes**

**Finding 11a:** *SMEs' capabilities and capacities influence the dimensions of processes of DT.*

**Finding 11b:** *The influences of the SMEs capabilities and capacities on DT processes are not general; rather, different capabilities and capacities dimensions influence distinct processes dimensions.*

**Example:** *While managerial capacities influence the decision-making and adoption, implementation and use, and adjustment and adaptation, the organisational capacity*

*influences the changes in function and resources, adjustment and adaptation, and strategic shifts and positioning.*

**Table 6.12 Typology of SMEs Capabilities and Capacities influence on Processes of DT**

<u>Main Factors</u>		<u>Sub Factors</u>		<u>References</u>
<b>Influencing Capabilities and Capacities</b>	<b>Influenced Processes</b>	<b>Influencing Capabilities and Capacities</b>	<b>Influenced Processes</b>	
<b>Managerial Capabilities</b>	<b>Decision-Making and Adoption</b>	<i>Intrinsic Managerial Attributes</i>	Decision initiation	Dixon et al. (2010); Kane et al. (2017); Helfat et al. (2009); Wiliandri (2020); Wu et al. (2021)
	<b>Implementation and Use</b>		Preparation	
	<b>Decision-Making and Adoption</b>		Decision initiation	
	<b>Adjustment and Adaptation</b>		Decision completion	
	<b>Decision-Making and Adoption</b>	<i>Extrinsic Attributes</i>	Adjustments	
	<b>Changes in Function and Resources</b>		Decision completion	
	<b>Adjustment and Adaptation</b>	<i>External Relationships</i>	Structural Changes	
	<b>Strategic Shifts and Positioning</b>		Adjustments	
	<b>Adjustment and Adaptation</b>		Positioning	
<b>Managerial Capacities</b>	<b>Adjustment and Adaptation</b>	<i>Intrinsic Relationships</i>	Adaptations	
	<b>Decision-Making and Adoption</b>	<i>Intrinsic Knowledge</i>	Decision completion	
	<b>Adjustment and Adaptation</b>		Adjustments	
	<b>Implementation and Use</b>		Implementation	
	<b>Adjustment and Adaptation</b>	<i>Intrinsic Skills</i>	Operation	
	<b>Implementation and Use</b>		Adjustments	
	<b>Adjustment and Adaptation</b>	<i>Intrinsic Experience</i>	Implementation	
<b>Adjustment and Adaptation</b>	Adjustments			
<b>Organisational Capabilities</b>	<b>Implementation and Use</b>		Implementation	

	<b>Adjustment and Adaptation</b>	<i>Intrinsic Organisational Capabilities</i>	Adjustments
	<b>Strategic Shifts and Positioning</b>		Shifts
	<b>Changes in Function and Resources</b>	<i>Extrinsic Organisational Capabilities</i>	Operational Change
	<b>Adjustment and Adaptation</b>		Adjustments
	<b>Decision-Making and Adoption</b>		Decision completion
	<b>Implementation and Use</b>		Implementation
	<b>Adjustment and Adaptation</b>		Adjustments
<b>Organisational Capacities</b>	<b>Changes in Function and Resources</b>	<i>Intrinsic Organisational Capabilities</i>	Structural Changes
			Operational Changes
	<b>Strategic Shifts and Positioning</b>		Shifts
	<b>Adjustment and Adaptation</b>	<i>Extrinsic Organisational Capabilities</i>	Adaptations
			Adjustments

#### 6.5.4 SMEs Capabilities and Capacities Influence on DT Outcomes

As illustrated in Table 5.13, the findings of this study show that the SMEs capabilities and capacities influence the DT outcomes. The SMEs capabilities and capacities' influence on outcomes of DT is quite significant, an observation in the study (Morakanyane et al., 2017). The managerial capabilities dimension broadly influences the business image and value, productivity and profitability, work processes and functions, customer and stakeholder satisfaction, and undesirable consequences of redundancy of skills and resources (Pousttchi et al., 2019). Meanwhile, managerial capacities influence the resources and abilities improvements, work processes and functions outcomes.

On the other hand, organisational capability influences business image and value, productivity and profitability, work processes and functions, resources and abilities improvements, and undesirable consequences of Security and Risk from misuse and misappropriation (Weritz et

al., 2020; Zhou et al., 2019). Meanwhile, organisational capacity influences business image and value, resources and abilities improvements, productivity and profitability, and undesirable consequences of resource and skill obsolescence and loss (Pousttchi et al., 2019). These influences confirm Morakanyane et al. (2017) argument that digital capabilities in the form of relevant skillsets and culture should be incorporated with digital technologies to achieve the best DT results (Weritz et al., 2020; Zhou et al., 2019). As underpinned by the dynamic managerial capabilities concept, every firm must be able to create, extend, or modify its resource base in line with the need to meet an intended organisational goal (Helfat et al., 2009). The typology of SMEs' capabilities and capacities influence on outcomes of DT is presented in Table 6.13.

The discussion on the SMEs capabilities and capacities' influence on DT outcomes indicates the following findings:

**Findings 12: Capabilities and Capacities Influence Outcomes**

**Finding 12a:** *SMEs capabilities and capacities can influence the dimensions of outcomes of DT.*

**Finding 12b:** *The influences of SMEs capabilities and capacities on DT outcomes are not general; rather, different capabilities and capacities influence distinct outcomes.*

**Example:** *The managerial capacities influence the resources and abilities improvements, work processes and function, whereas the organisational capacities influence only the resources and abilities improvements, productivity and profitability, business image and value, and undesirable consequences.*

**Table 6.13 Typology of SMEs Capabilities and Capacities influence on Outcomes of DT**

<u>Main Factors</u>		<u>Sub Factors</u>		<u>References</u>	
<b>Influencing Capabilities and Capacities</b>	<b>Influenced Outcomes</b>	<b>Influencing Capabilities and Capacities</b>	<b>Influenced Outcomes</b>		
<b>Managerial Capabilities</b>	<b>Business Image and Value</b>	<i>Intrinsic Managerial Attributes</i>	Image enhancement		
	<b>Work Processes and Functions</b>		Image enhancement		
	<b>Productivity and Profitability</b>		Process outcomes		
	<b>Undesirable consequences</b>	<i>Extrinsic Attributes</i>	Profitability		
	<b>Customer and Stakeholder Satisfaction</b>		Productivity		
	<b>Work Processes and Functions</b>	<i>External Relationships</i>	Resource and Skill obsolescence and loss		
			Customer satisfaction		
	<i>Internal Relationships</i>	Stakeholder satisfaction			
<b>Managerial Capacities</b>	<b>Resources and Abilities Improvements</b>	<i>Intrinsic Knowledge</i>	Process outcomes		
	<b>Work Processes and Function</b>	<i>Intrinsic Skills</i>	Abilities		
	<b>Resources and Abilities Improvements</b>	<i>Intrinsic Experience</i>	Process outcomes		
<b>Organisational Capabilities</b>	<b>Work Processes and Functions</b>	<i>Intrinsic Organisational Capabilities</i>	Abilities	Helfat et al. (2009)	
	<b>Productivity and Profitability</b>		Process outcomes		
	<b>Undesirable Consequences</b>		Productivity		
	<b>Productivity and Profitability</b>	<i>Extrinsic Organisational Capabilities</i>	Security and Risk		Morakanyane et al. (2017)
	<b>Business Image and Value</b>		Profitability		
	<b>Productivity and Profitability</b>		Value enhancement		
	<b>Business Image and Value</b>		Profitability		
<b>Organisational Capacities</b>	<b>Resources and Abilities Improvements</b>	<i>Intrinsic Organisational Capacities</i>	Image enhancement	Pousttchi et al. (2019)	
	<b>Productivity and Profitability</b>		Resources		
	<b>Business Image and Value</b>		Profitability		
	<b>Undesirable Consequences</b>	<i>Extrinsic Organisational Capacities</i>	Image enhancement		
			Resource and Skill obsolescence and loss		

## 6.6 Chapter Summary

This chapter discussed the analysis and findings of the study of SMEs' DT in DCs. The discussion was presented according to the study's objectives and discovered themes and findings while referencing the related extant literature, theory, and gaps. The discussions are sectioned based on the study's objectives regarding the identified drivers, the delineated processes, the evaluated outcomes, the examined SMEs capabilities and capacities and the influences among the factors.



## CHAPTER SEVEN





















### 7 FRAMEWORK DEVELOPMENT

#### 7.1 Chapter Overview

The chapter focuses on developing the frameworks for the study based on the findings, discussion and conceptual frameworks in Section 3.5.5. The framework development is presented in four sections. The first section considers the framework for the influences among the drivers, processes, and outcomes. The second section factors the SMEs capabilities and capacities' influence on the drivers, processes and outcomes. The third section presents the development of a theoretical and practice-based framework suitable for practitioners of DT of SMEs in DCs.

The legend of colour codes used in the figures of this chapter to represent the different factors and typologies is shown in Table 7.1.

**Table 7.1 Legend of Colour Codes in Figures of Chapter 7**

Colour	Shades of Colours				Typologies Represented
<i>Greyish</i>					<b>Digital Technologies</b>
<i>Reddish</i>					<b>Drivers of DT</b>
<i>Yellowish</i>					<b>Processes of DT</b>
<i>Greenish</i>					<b>Outcomes of DT</b>
<i>Blueish</i>					<b>Capabilities and Capacities of SMEs</b>

## 7.2 Frameworks for the Influences of the Drivers, Processes, and

### Outcomes

In response to the second research question on how the DT drivers, processes, and outcomes influence one another in the DT of SMEs, the study's findings and discussions reveal interesting influences among the drivers, processes, and outcomes. These influences are seen as the *influence of drivers on processes, drivers on outcomes, processes on outcomes and outcomes on drivers*. The factors of the third-order dimensions of the analysis were considered for the frameworks representing the influences. The frameworks were diagrammatically illustrated with shapes, lines, colours and arrows. The graphic representation allows the acquisition of insights, development of detailed understanding, and appreciation of new knowledge (Miles & Huberman, 1994; Verdinelli & Scagnoli, 2013; Yin, 2011).

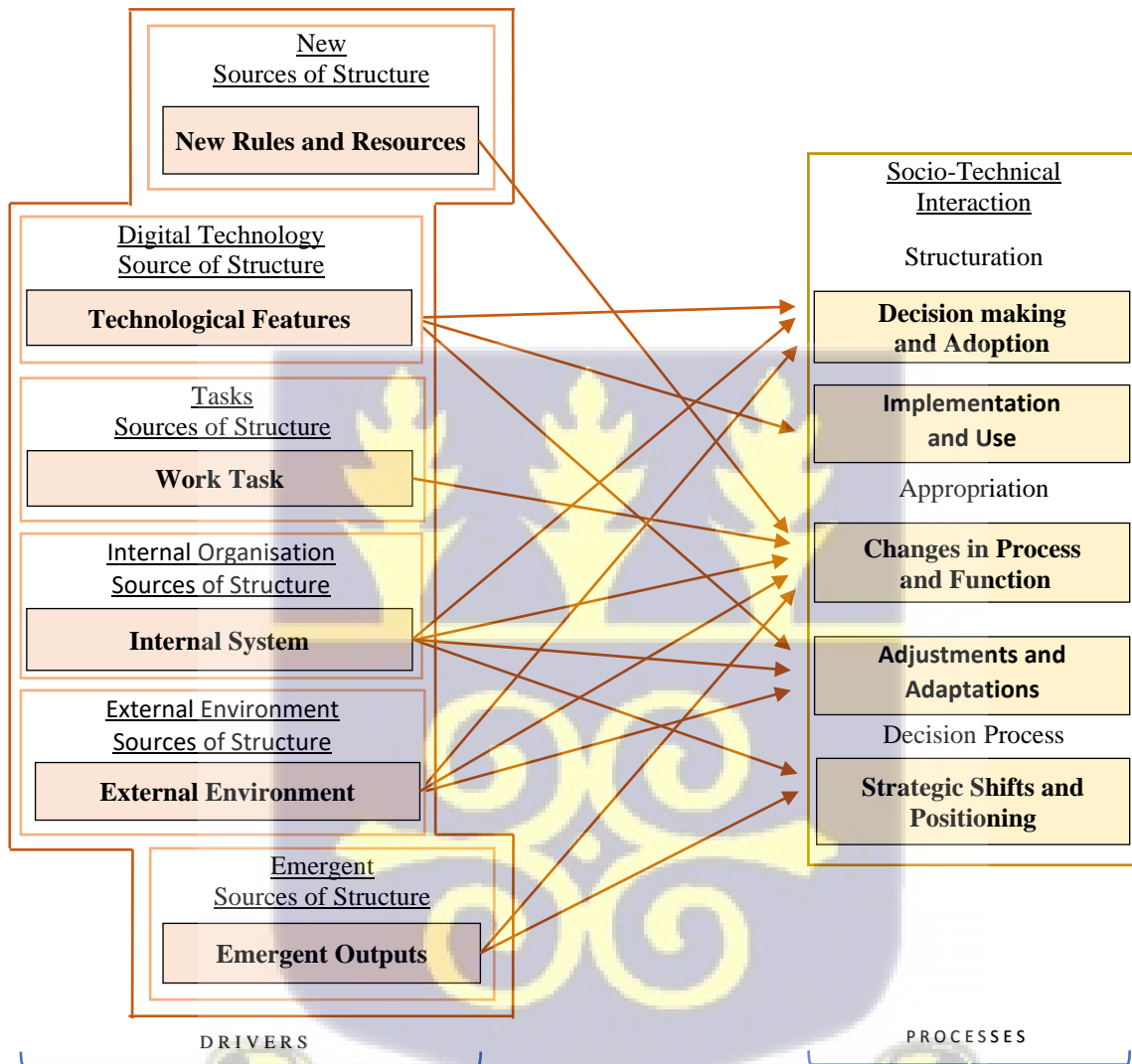
These influences have been presented in Section 5.4 and discussed in Section 6.4. The influences are shown as arrows from the influencing factor to the influenced factor in the framework development. Specific influencing factors are linked to specific influenced factors, as discussed in Section 6.4 and presented in Tables 6.6, 6.7, 6.8, and 6.9. The conceptualisation of the framework represents these influences in the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5, to obtain the framework of the influences. Towards the framework development, four different frameworks are developed for the influence of drivers on processes, drivers on outcomes, processes on outcomes and outcomes on drivers and presented in the following subsections.

#### 7.2.1 Framework for the Influence of DT Drivers on Processes

The study shows that distinct dimensions of DT drivers influence specific processes in the DT of SMEs. The details of these influences of the DT drivers on the DT processes have been

presented in Table 5.6 of Section 5.4.1 and discussed in Section 6.4.1. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences of the drivers on processes is illustrated in Figure 7.1.

**Figure 7.1** *The Drivers-Processes Framework of DT*

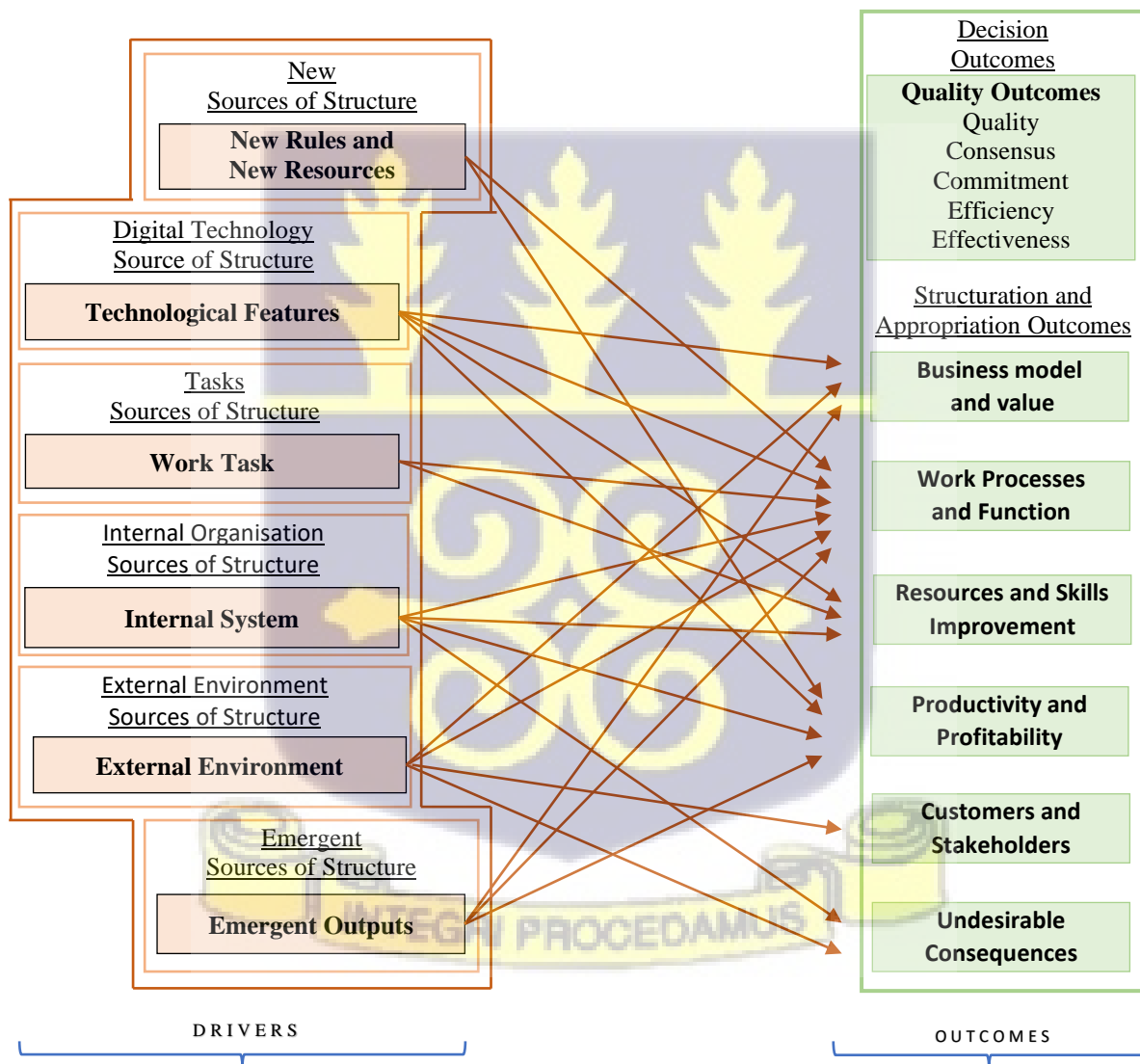


Note. Source: Researcher's Constructs

### 7.2.2 Framework for the Influence of DT Drivers on Outcomes

The study shows that distinct dimensions of DT drivers influence specific outcomes in the DT of SMEs. The details of these influences of the DT drivers on the DT outcomes have been presented in Table 5.7 of Section 5.4.2 and discussed in Section 6.4.2. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences of the drivers on processes is illustrated in Figure 7.2.

**Figure 7.2** *The Drivers-Outcomes Framework of DT*

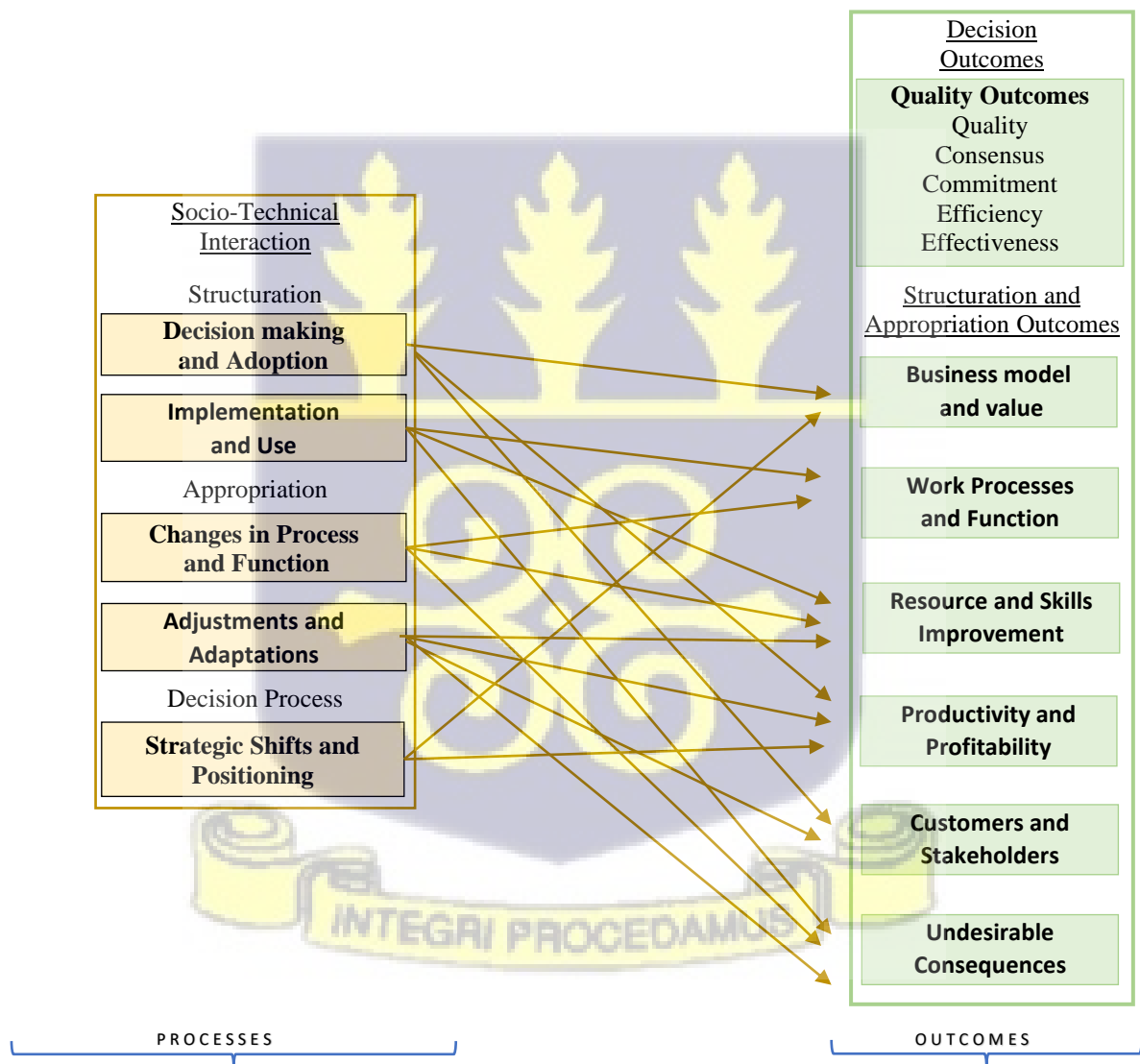


Note. Source: Researcher's Constructs

### 7.2.3 Framework for the Influence of DT Processes on Outcomes

The study shows that distinct dimensions of the DT processes influence specific outcomes in the DT of SMEs. The details of the influences of DT processes on DT outcomes have been presented in Table 5.8 of Section 5.4.3 and discussed in Section 6.4.3. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences of the drivers on processes is illustrated in Figure 7.3.

**Figure 7.3** *The Processes-Outcomes Framework of DT*

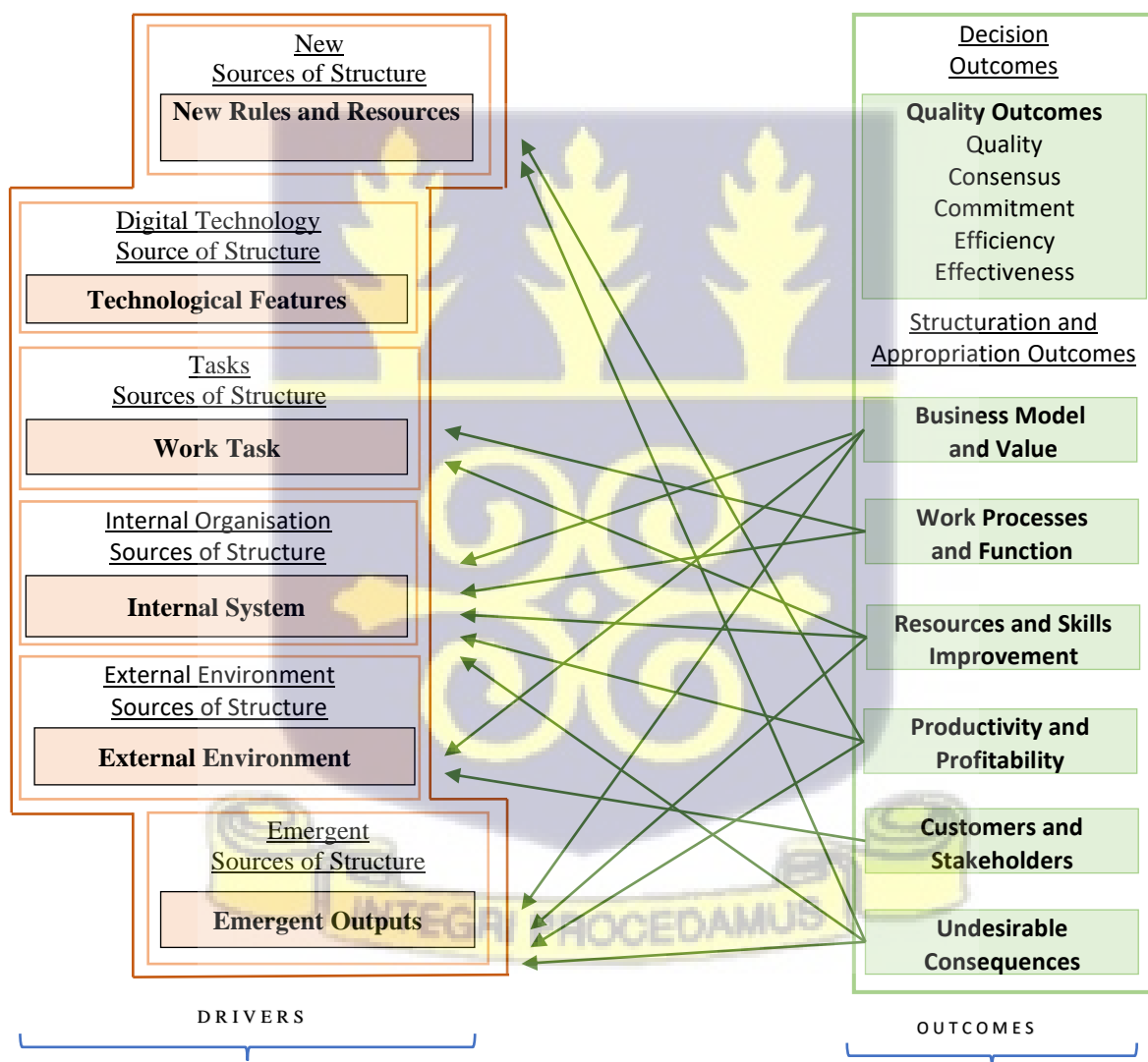


Note. Source: Researcher's Constructs

### 7.2.4 Framework for the Influence of DT Outcomes on Driver

The study shows that distinct dimensions of DT outcomes influence specific drivers in the DT of SMEs. The details of these influences of the DT outcomes on the DT drivers have been presented in Table 5.9 of Section 5.4.4 and discussed in Section 6.4.4. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences of the drivers on processes is illustrated in Figure 7.4.

**Figure 7.4** *The Outcomes - Driver Framework of DT*



Note. Source: Researcher's Constructs

### 7.3 Frameworks for the SMEs capabilities and Capacities' influence on DT

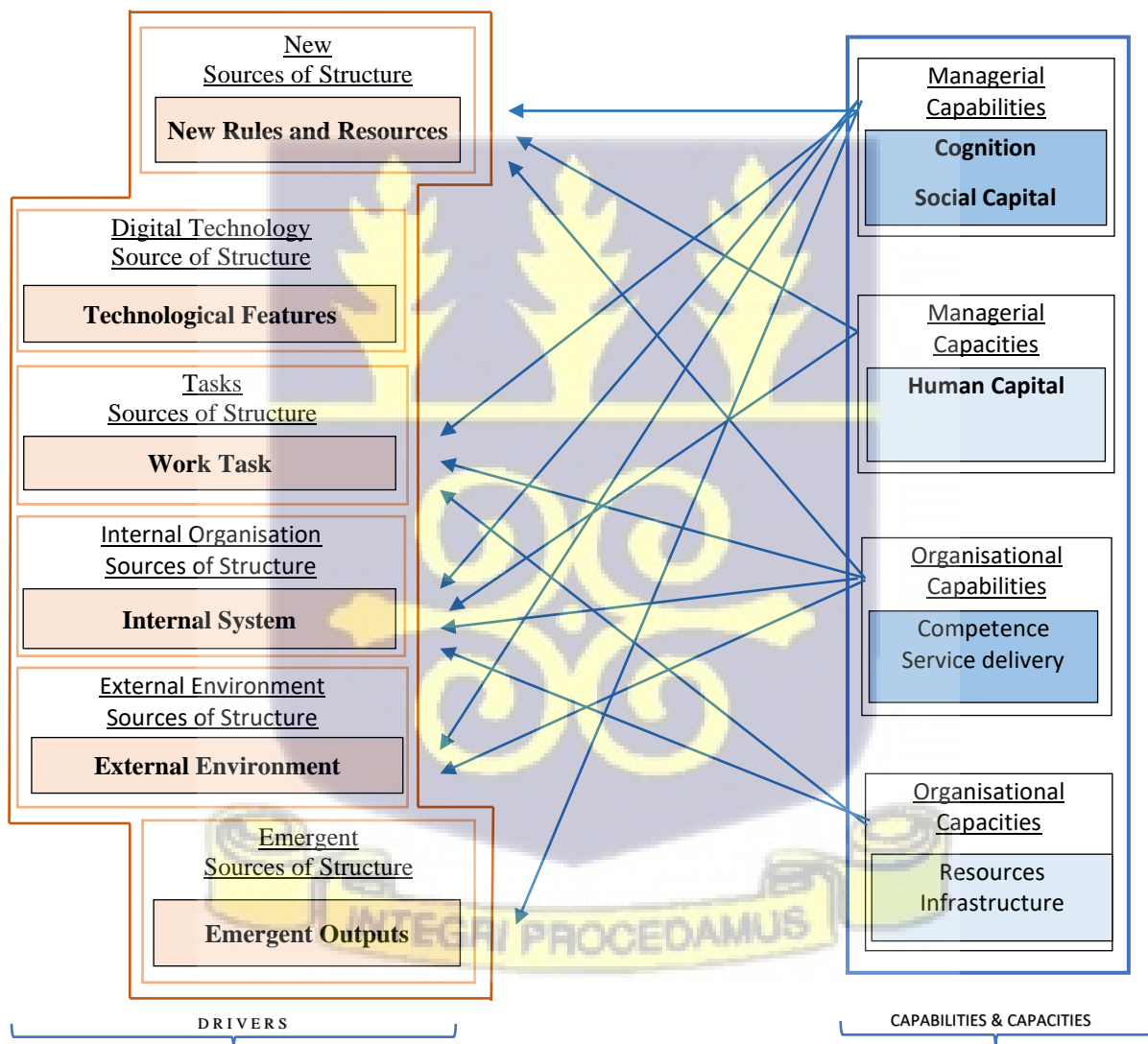
In response to the third research question on how the SMEs capabilities and capacities influence the DT drivers, processes and outcomes, the study's findings and discussions reveal interesting effects on the drivers, processes, and outcomes. These relationships are seen between SMEs capabilities and capacities, and drivers, the SMEs capabilities and capacities, and processes, and the SMEs capabilities and capacities, and outcomes. The factors for the framework are considered in the third-order dimensions of the analysis. The frameworks were diagrammatically illustrated with shapes, lines, colours and arrows. The graphic representation allows the acquisition of insights, development of detailed understanding, and appreciation of new knowledge (Miles & Huberman, 1994; Verdinelli & Scagnoli, 2013; Yin, 2011).

These influences have been presented in Section 5.3 and discussed in Section 6.5. The influences are shown as arrows from the influencing factor to the influenced factor in the framework. Specific influencing factors are linked to specific influenced factors, as discussed in Section 6.5 and presented in Tables 6.11, 6.12, and 6.13. The conceptualisation of the framework represents these influences in the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. to obtain the framework of the influences. Towards the framework development, three different frameworks are developed for the influence of capabilities and capacities on drivers, capabilities and capacities on processes, and capabilities and capacities on outcomes, and presented in the following subsections for each influencing effect found.

### 7.3.1 Framework for the Influence of Capabilities and Capacities on DT Drivers

The study shows that SMEs capabilities and capacities influence specific drivers in the DT SMEs. These influences of the SMEs capabilities and capacities on the DT drivers have been presented in Table 5.10 of Section 5.5.1 and discussed in Section 6.5.1. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences is illustrated in Figure 7.5.

**Figure 7.5** *The Capabilities and Capacities - Drivers Framework in DT*

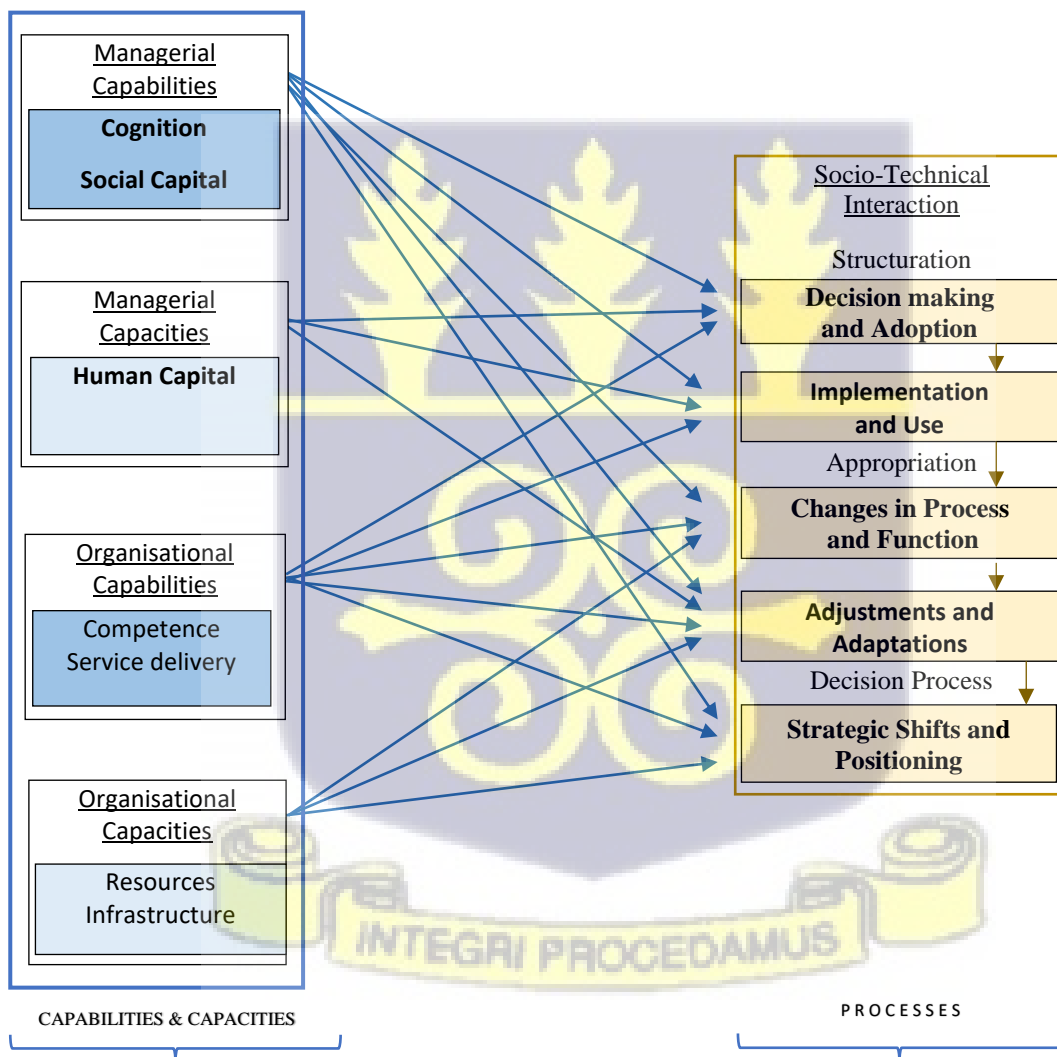


Note. Source: Researcher's Constructs

### 7.3.2 Framework for the Influence of Capabilities and Capacities and DT Processes

The study shows that SMEs capabilities and capacities influence specific processes in the DT SMEs. These influences of the SMEs capabilities and capacities on the DT processes have been presented in Table 5.11 of Section 5.5.2 and discussed in Section 6.5.2. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences is illustrated in Figure 7.6.

**Figure 7.6** *The Capabilities and Capacities - Processes Framework of DT*

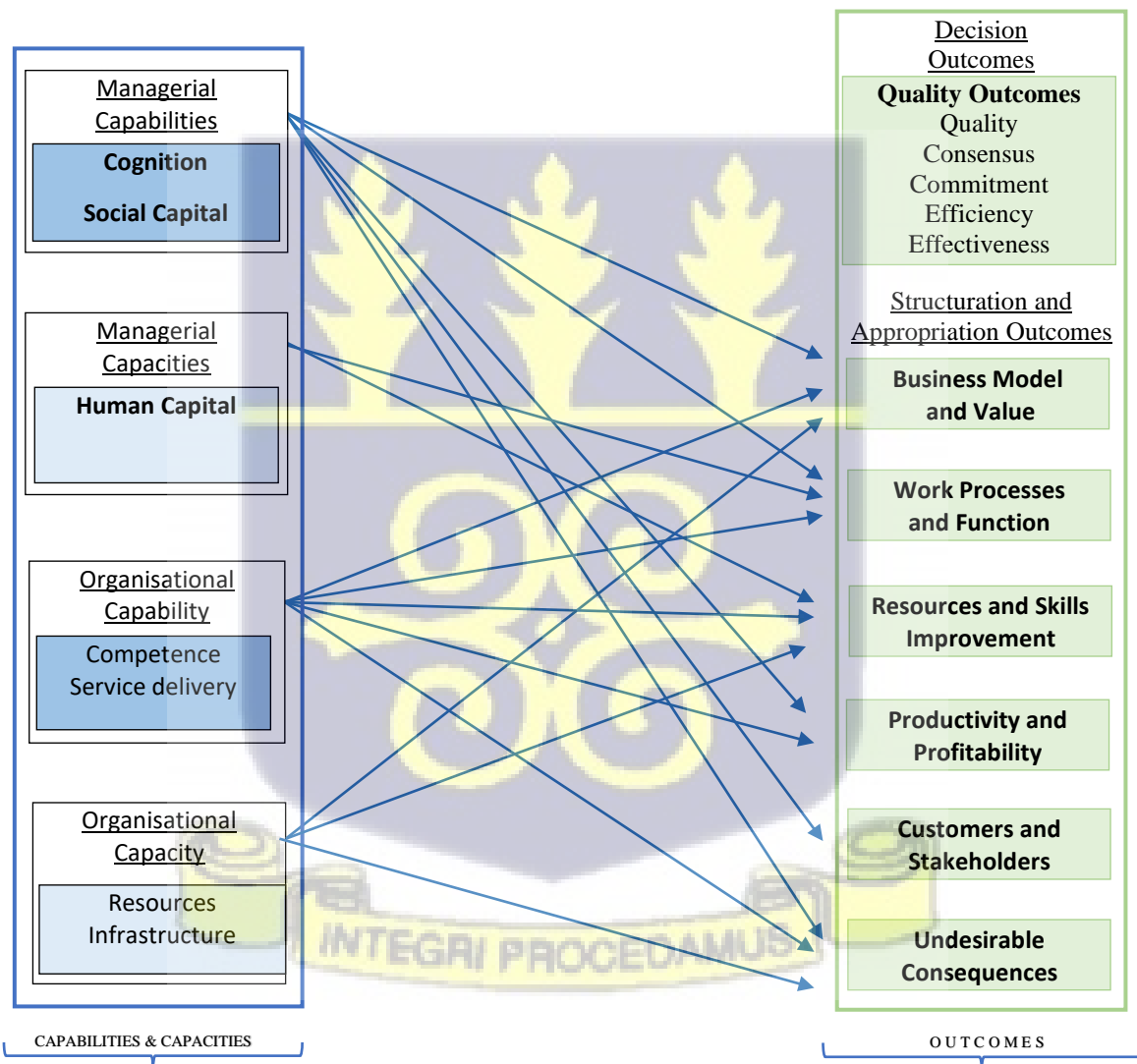


Note. Source: Researcher's Constructs

### 7.3.3 Framework for the Influence of Capabilities and Capacities and DT Outcomes

The study shows that SMEs capabilities and capacities influence specific outcomes in the DT of SMEs. These influences of the SMEs capabilities and capacities on the DT outcomes have been presented in Table 5.12 of Section 5.5.3 and discussed in Section 6.5.3. These are coupled with the conceptual framework for the study, as presented in Figure 3.8 of Section 3.5.5. The framework of the influences is illustrated in Figure 7.7.

**Figure 7.7** *The Capabilities and Capacities - Outcomes Framework of DT*



Note. Source: Researcher's Constructs

## 7.4 Theoretical and Practice-Based Framework for the DT of SMEs

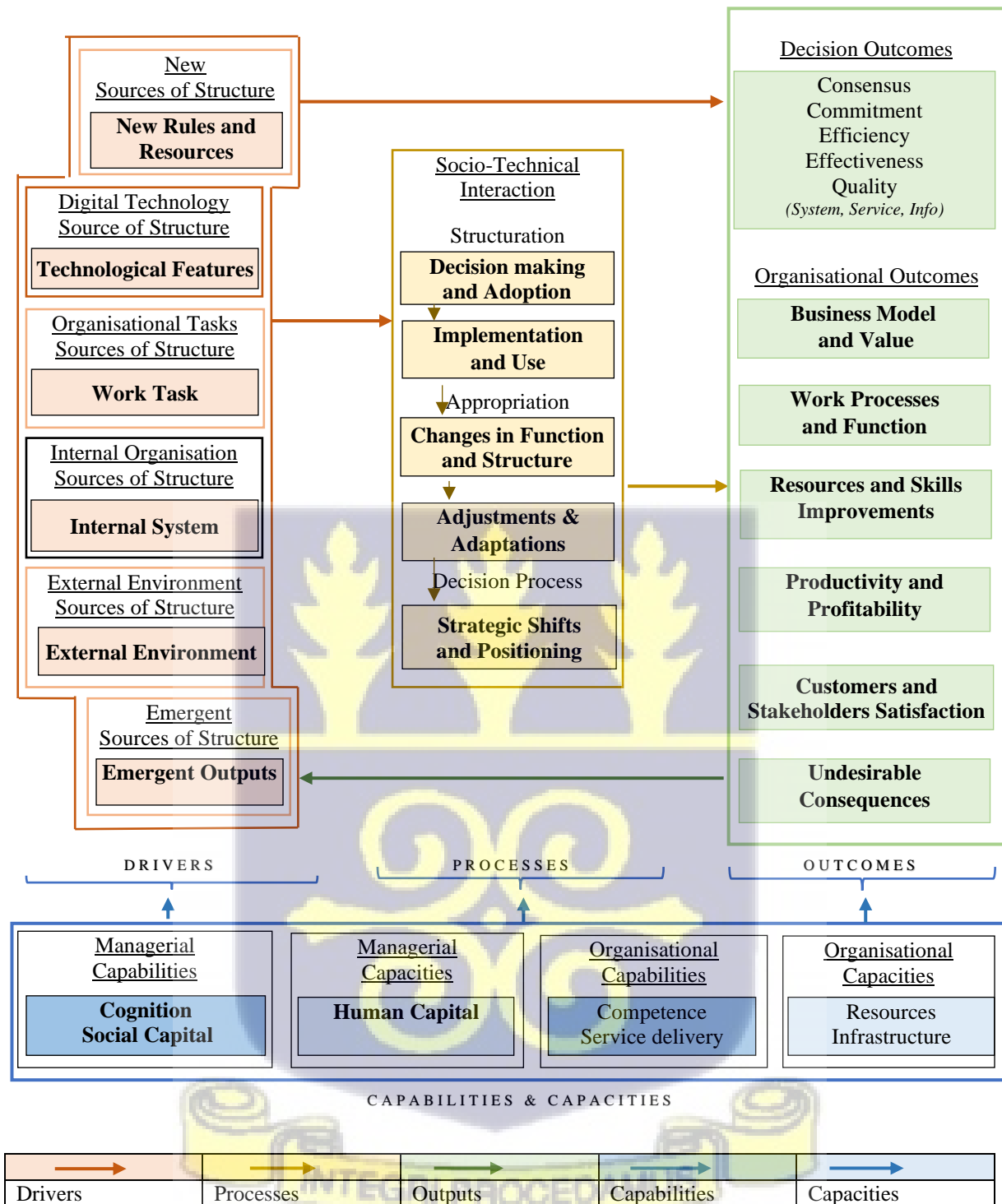
To develop the theoretical and practice-based framework, the seven different frameworks from the previous sections had to be integrated to form one single framework. After the integration, the framework had to be simplified and redesigned to suit theoretical, academic, and practice settings and use. The framework was diagrammatically illustrated with shapes, lines, colours and arrows. The graphic representation allows the acquisition of insights, development of detailed understanding, and appreciation of new knowledge (Miles & Huberman, 1994; Verdinelli & Scagnoli, 2013; Yin, 2011).

### 7.4.1 Integrated Framework Development for the DT

An integrated framework of SMEs' DT in DCs is developed based on the seven frameworks developed in the previous sections. These frameworks are the drivers-processes framework, the drivers-outcomes framework, the processes-outcomes framework, and the outcomes-drivers framework. Others are the capability/capacity–drivers framework, the capability/capacity–processes framework, and the capability/capacity–outcomes framework. Based on the conceptual framework (Figure 3.8) and the final dimensions of the DT factors derived from the findings and discussion, while representing the influences in simple arrows, the post-study integrated framework is developed and illustrated in Figure 7.8.

Meanwhile, the influences among the DT factors cannot be generalised but are specific to particular dimensions of the factors. Therefore, Figures 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, and 7.7 are relevant to understanding the integrated framework regarding the detailed influences.

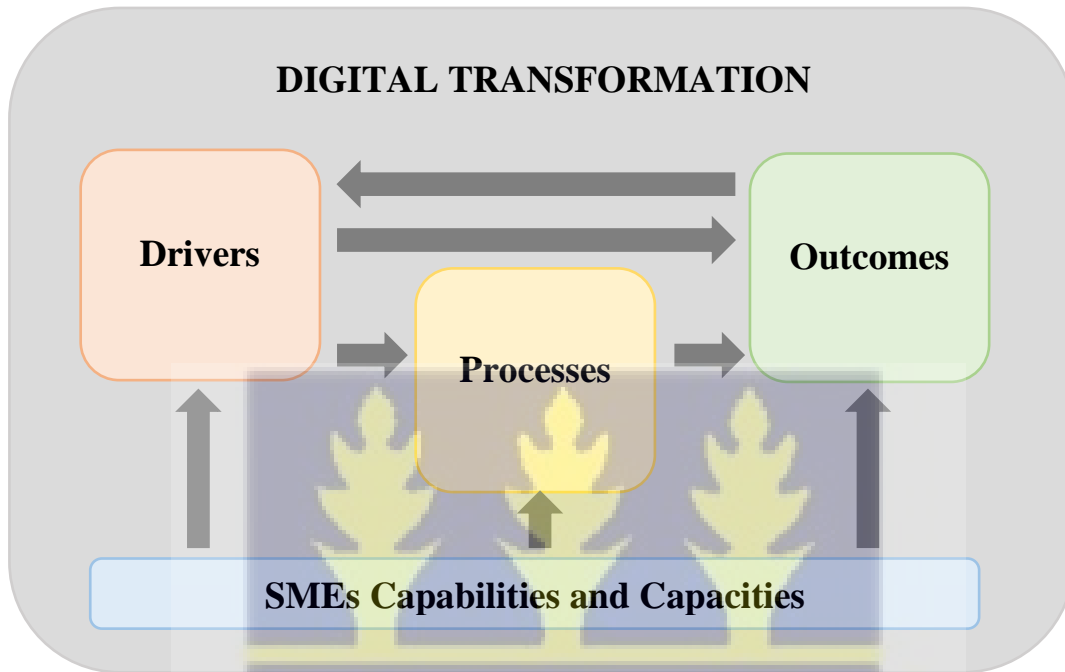
Figure 7.8 Post-Study Framework for the DT of SMEs



Note. Source: Researcher's Constructs

The post-study integrated framework is further simplified akin to the simplified pre-study conceptual framework (Figure 3.10) and presented in Figure 7.9.

**Figure 7.9 Simplified Post-Study Framework**



Legend for Figure 7.9

				➔
Drivers	Processes	Outcomes	Capabilities and Capacities	Influence Direction

Note. Source: Researcher's Constructs



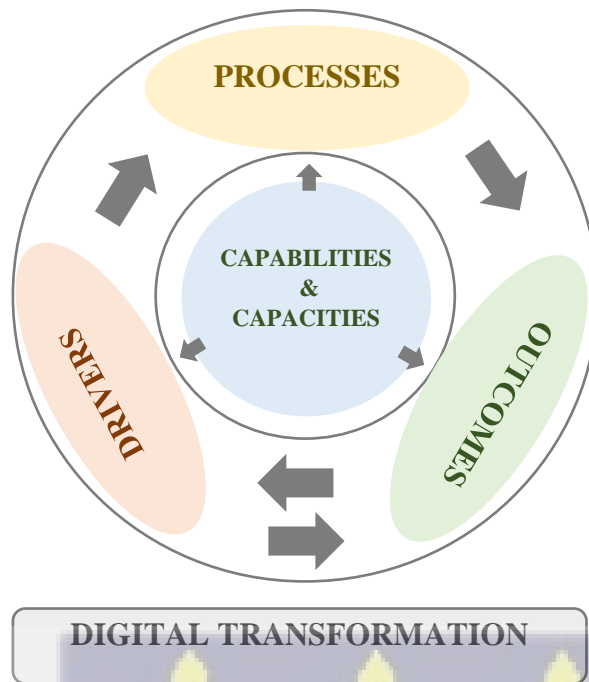
#### 7.4.2 Development of the Theoretical and Practice-Based Framework (DPOCC)

The integrated framework (Figure 7.9) suits academic and research environments and purposes. However, the framework had to be tweaked to make it worthwhile for practitioners, entrepreneurs, managers, system integrators, policymakers, and researchers. This tweaking and redesign are to make it suitable for both theoretical and practice-based perspectives for research, practice and policy relating to the DT of SMEs in DCs. It then brings clarity, understanding and practicality to its application and use among researchers and business practitioners.


The study's findings, discussions, and conceptualisations show that the DT drivers influence the DT processes and outcomes. In contrast, the DT processes, in turn, influences the DT outcomes, and at the same time, the DT outcomes can influence the DT drivers. Hence some influence cycle is observed. That is, from drivers to processes, then to outcomes, and back to drivers. Therefore, a cyclical framework is envisioned to represent the cyclic influences of drivers, processes, and outcomes to express this observation practically. Meanwhile, all these factors and their influences are also influenced by the SMEs capability and capacities.

The theoretical and practice-based framework is based on this cyclic influence of the drivers, processes and outcomes of DT and the influencing effect of the SMEs capabilities and capacities. Because the influence appears cyclical, the framework's design must be cyclic or circular. Hence the drivers, processes and outcomes are placed in the periphery of a circular arrangement with the capabilities and capacities in the centre. The developed theoretical and practice-based DT framework is described as the *Driver-Process-Outcome-Capability-Capacity Framework (DPOCC Framework)* and is shown in Figure 7.10.

**Figure 7.10 Digital Transformation Framework (DPOCC Framework)**



Legend for Figure 7.10

				
Drivers	Processes	Outcomes	Capabilities	Influence Direction

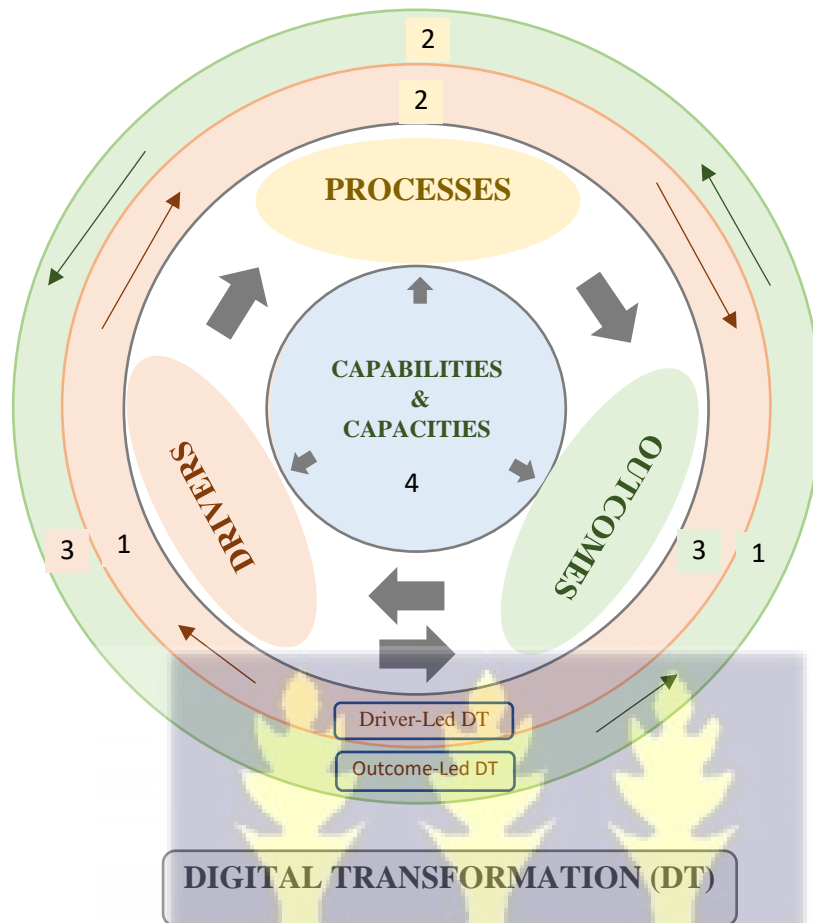
*Note.* Source: Researcher’s Constructs

### 7.4.3 The Approaches to the DPOCC Framework for DT

In explaining the practical application of the theoretical and practice-based DPOCC framework, two approaches are considered to understand the framework from practitioners' perspectives. These approaches concern ‘what initiates the need to pursue DT,’ which may result from the desired outcomes or the compelling drivers. The ensuing outcomes-led and driver-led approaches form the basis of the theoretical and practice-based framework.

The Driver-Led and Outcome-Led Approaches of the Theoretical and Practice-Based DT Framework (DPOCC Framework) are shown with arrows in Figure 7.11

**Figure 7.11 DPOCC Framework (with Driver-Led and Outcome-Led Approaches)**



Legend for Figure 7.11

				➔	→
Drivers	Processes	Outcomes	Capabilities and Capacities	Influence Direction	Flow Direction

Note. Source: Researcher’s Constructs

Meanwhile, the DPOCC framework must be accompanied by Figures 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, and 7.7 as charts to help explain and understand the specific influences among the factors. Moreover, Tables 5.2, 5.3, 5.4 and 5.9 would provide the detailed examples of the drivers, processes, outcomes, capabilities, and capacities, along with their classifications.

### *The Driver-Led Approach to the DPOCC Framework*

The framework is viewed from practitioners' perspectives regarding how they would consider and approach DT due to what drives them to pursue it.

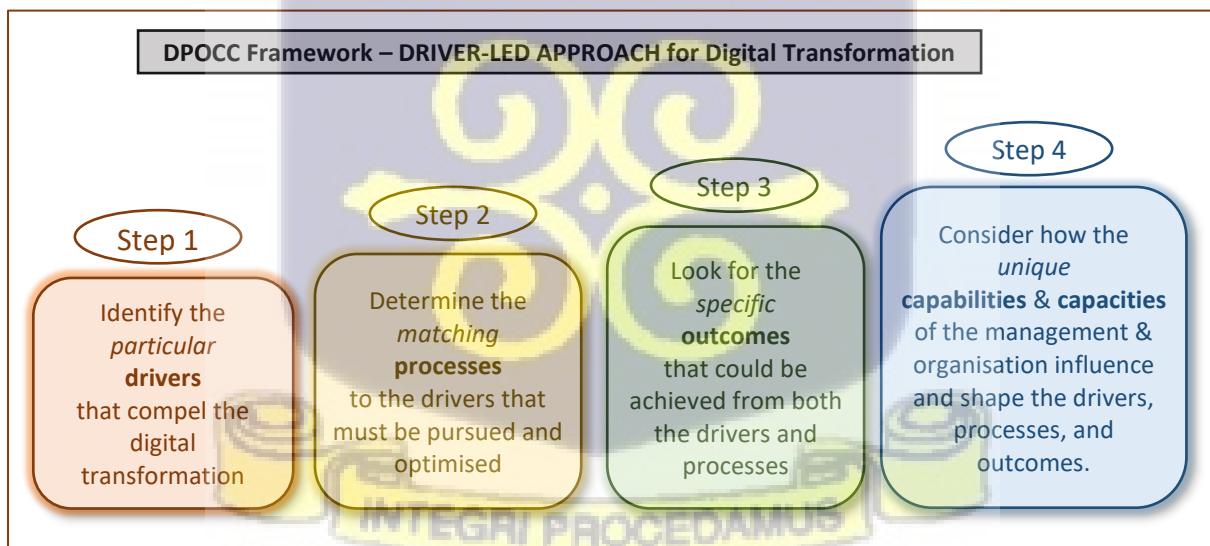
The compelling drivers are first established, and then the necessary and corresponding processes for the drivers are followed and optimised.

Meanwhile, the drivers and the corresponding processes are expected to result in specific outcomes based on the framework.

Finally, the influence of capabilities and capacities must be considered to help optimise the drivers, processes, and outcomes.

In simple steps, the driver-led approach is illustrated in Figure 7.11:

**Figure 7.12 DPOCC Framework - Steps for Driver-Led Approach**



Note. Source: Researcher's Constructs

***The Outcome-Led Approach to the DPOCC Framework***

The framework is viewed from practitioners' perspectives regarding how they would consider and approach DT due to their intended outcomes.

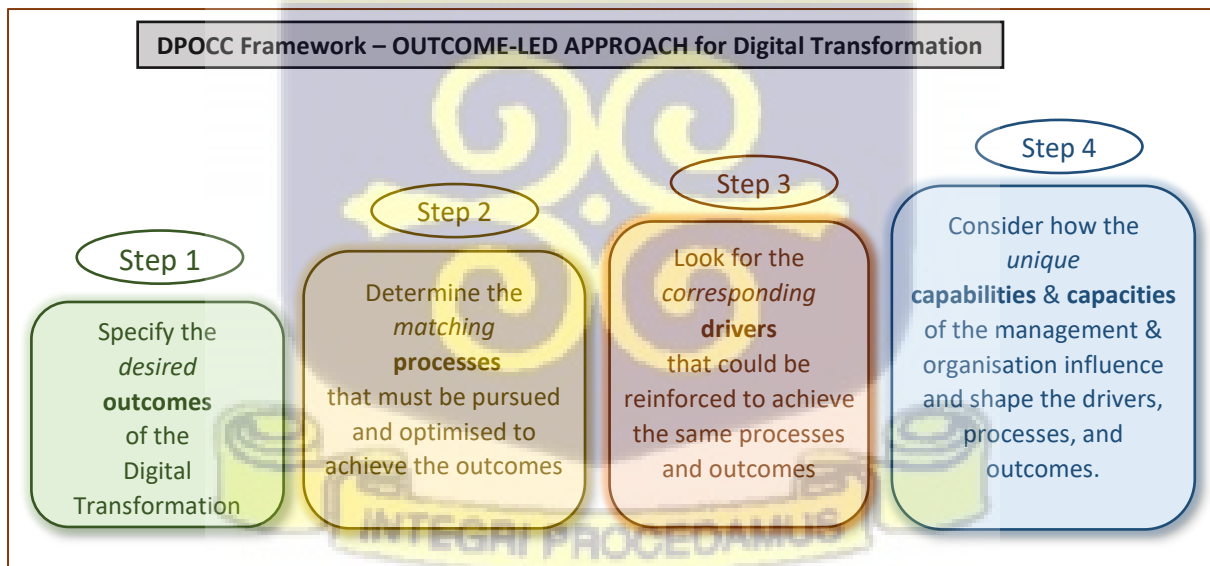
The desired outcomes are to be established first, and then the necessary and corresponding processes are followed and optimised.

Meanwhile, the outcomes and the processes link back to specific drivers that could be considered and enhanced to reinforce the achievement of the outcomes.

Finally, the capabilities and capacities' influence that need to be considered to help optimise the drivers, processes and outcomes are inferred from the framework.

In simple steps, the outcomes-led approach is illustrated in Figure 7.11:

**Figure 7.13 DPOCC Framework - Steps for Outcome-Led Approach**



Note. Source: Researcher's Constructs

## 7.5 Chapter Summary

The findings and discussions were combined with the conceptual framework developed in Chapter 3 to understand the relationships and influences among the DT factors and conceptualise a post-study framework. These conceptualisations included frameworks for the influence of drivers on the processes, drivers on the outcomes, processes on the outcomes and outcomes on drivers. Other framework combinations were used to understand the influences of the SMEs capabilities and capacities on the DT drivers, processes, and outcomes. An integrated framework was developed and simplified to appreciate the interactions of the drivers, processes, outcomes, capabilities, and capacities. Furthermore, a theoretical and practice-based framework was also developed to suit practitioners' perspectives in DT. It was illustrated with two approaches, driver-led and outcome-led, in the practical application of DT.



## CHAPTER EIGHT

### 8 POST-STUDY EVALUATION OF THE DPOCC FRAMEWORK

#### 8.1 Chapter Overview

This chapter presents the post-study evaluation of the developed theoretical and practice-based DPOCC framework for the DT of SMEs in three sections. The first section presents the purpose and approach for undertaking the post-study evaluation. Meanwhile, the second section describes the methodology, feedback, and media coverage of a workshop with SMEs. The third section discusses the methodology, case analysis, approaches and feedback on implementing ERP software with the DPOCC Framework.

#### 8.2 The Purpose and Methods of the Post-Study Evaluation

The developed theoretical and practice-based framework (DPOCC Framework) and the specific steps and approaches were subjected to post-study evaluations to assess enterprise practitioners' appreciation and practicality of the framework. The purpose and objective of the evaluation were to confirm the study's contribution to knowledge and practice regarding DT. The evaluation sought to determine how entrepreneurs and managers of SMEs understand and appreciate the DPOCC framework. It also sought to examine how they could apply it to their unique businesses. The evaluation further sought to determine if the predefined steps and approaches for using the DPOCC framework were feasible among SMEs.

These objectives were achieved with two methods:

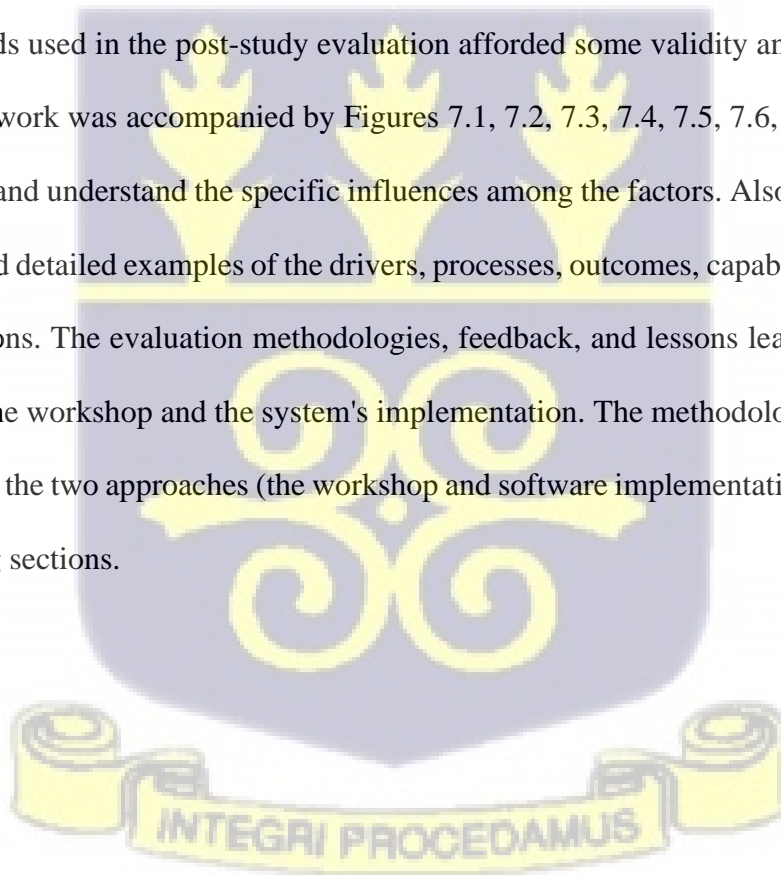
- The *first* involved organising a workshop with entrepreneurs, owners and managers of SMEs.

This approach allowed industry players and SME practitioners to discuss the usefulness and feasibility of the DPOCC Framework.

- The *second* entailed the implementation of Online ERP software in three different companies for their DT.

This approach allowed the enterprises' management and employees to assess the applicability and practicality of the DPOCC Framework.

The two methods used in the post-study evaluation afforded some validity and reliability. The DPOCC Framework was accompanied by Figures 7.1, 7.2, 7.3, 7.4, 7.5, 7.6, and 7.7 as charts to help explain and understand the specific influences among the factors. Also, Tables 5.2, 5.3, and 5.4 provided detailed examples of the drivers, processes, outcomes, capabilities, capacities, and classifications. The evaluation methodologies, feedback, and lessons learnt are discussed separately for the workshop and the system's implementation. The methodologies, discussions and feedback of the two approaches (the workshop and software implementation) are presented in the following sections.



### **8.3 The Workshop with SMEs for the Post-Study Framework Evaluation**

The methodology, discussions, feedback and lessons from the presentation at the workshop for the theoretical and practice-based DPOCC framework post-study evaluation are presented in this section.

#### **8.3.1 The Methodology for the Workshop with SMEs**

An opportunity was sought with the Ashanti Regional Chapter of the Ghana Chamber of Commerce and Industry to hold a workshop with its members of SME entrepreneurs and managers. One hour was allowed for the presentation, followed by another hour of questions and discussions. About sixty (60) members of the Chapter participated in the workshop. The presentation began with an explanation of what DT is all about. The illustration of the DPOCC framework was then made, explaining and giving details about how to determine one factor from the other using the framework and the accompanying charts while citing examples of the drivers, processes, outcomes, capabilities, and capacities from the tables. The explanation highlighted both the driver-led and outcome-led approaches to using the DPOCC framework.

There were open discussions after presenting the framework's purpose, approaches, use, and benefits. During the discussions, participants were able to specify some expected outcomes and use the framework to determine the possible processes to optimise, drivers to enhance, and capabilities and capacities to consider as the outcomes-led approach. For the driver-led approach, participants mentioned some drivers that moved them towards DT and used the framework to determine the processes to optimise and the expected outcomes. Questions were asked by participants seeking further clarification and understanding. Some members also made suggestions on how the framework could be applied.

### 8.3.2 The Feedback and Lessons from the Workshop

The discussions were fruitful as participants openly and heartily participated. The entrepreneurs and managers appreciated the purpose of the framework. Most of them admitted that attempts to transform digitally have always been arbitral and controlled by information technology professionals without the direct involvement of the management. Some acknowledged that they have never thought of the management specifying expected outcomes, determining the processes, and enhancing the drivers while considering the influence of capabilities and capacities in their previous software implementations. On the other hand, for the driver-led approach, they had never thought of identifying what drives them towards DT to determine the processes to optimise and the outcomes to expect. The framework's purpose was accepted as beneficial for DT. At the same time, a few indicated the need to review their current systems and implementations regarding this newly proposed DPOCC framework.

The two led approaches involved in the framework were considered by many as novel, innovative, and never thought of approaches towards DT. Others considered the approaches quite elaborate, which may take some time to comprehend but is worthwhile. Some wondered whose responsibility it should be to introduce and direct the use of the framework, whether it is the system implementers or the management. The forum eventually agreed that it should be a joint initiative and responsibility, with understanding and cooperation between the implementers and management. Some still insisted on the inclusion of employees in the entire process. While giving examples of the drivers, processes, outcomes and SMEs capabilities and capacities, most participants believed that the charts and tables accompanying the main framework could be expanded. At the same time, others believed that the chart should remain a guide only and need not be expanded. The participant agreed upon the benefits expressed and alluded to the framework's potential contribution to the DT of SMEs in DCs.

### 8.3.3 The Media Coverage of the Workshop

The public media reports on the workshop are presented in this section to affirm the veracity of the story about the workshop as a means of evaluating the post-study framework (DPOCC Framework).

There was media coverage of the workshop by the Multimedia Group (Joy FM, Joy News (TV), Luv FM, Nhyira FM, Myjoyonline) and Citi Media Network (Citi FM, Citi TV, and Citi Newsroom). The Multimedia Group is Ghana's most extensive independent commercial, media, and entertainment company. Citi Media is a growing media house in Ghana, having other affiliate stations country-wide.

The news report and the content are available at:

- a. Myjoyonline with the URL: <https://www.myjoyonline.com/a-new-practice-based-framework-for-the-digital-transformation-of-businesses-developed-by-a-ghanaian-mis-consultant/> with the title “A new practice-based framework for the digital transformation of businesses, developed by a Ghanaian MIS Consultant.” and
- b. Citi Newsroom with the URL: <https://citinewsroom.com/2021/06/ghanaian-develops-digital-transformation-framework-for-business-owners/> with the title “*Ghanaian develops digital transformation framework for business owners.*”

The evidence of the two reports available at the respective online pages are provided in Appendix 6 and 7.

The video footage of the Joy News report is available on YouTube with the link <https://youtu.be/zVkJkP4rTPQ>.

## **8.4 The ERP Software Implementation for the Post-Study Framework**

### **Evaluation**

The methods in evaluating the theoretical and practice-based DPOCC framework through the practical implementation of an online ERP system for the DT of three businesses separately and the feedback and lessons obtained are presented in this section. This implementation was to ascertain the practical applicability of the DPOCC framework in DT. It was an attempt to go beyond mere views and ideas to practical implementation experience to evaluate how an intended DT would be with the direct use of the framework.

#### **8.4.1 The Methodology for the System Implementation**

Three business cases were considered for the post-study practical evaluation of the DT framework (DPOCC framework). The businesses involved were PF Ltd, EAC Ltd, and GL Ltd. All three businesses intend to transform their businesses digitally by introducing a specific enterprise resource planning (ERP) system. The system implemented is ECOUNT ERP, an Online ERP system that is cloud-hosted, web-based, comprehensive, highly customisable and affordable. It is a multi-user, multi-location and multi-currency system with modules for inventory, manufacturing, sales, procurement, accounting, payroll and collaboration.

As a management information systems consultant and practitioner, the researcher was consulted separately by the companies to help achieve their DT objectives. The researcher then took advantage of the opportunity and evaluated the developed theoretical and practice-based DT framework (DPOCC framework).

Without directly disclosing to the companies that a particular approach and framework were being followed, the researcher applied all the mechanisms required by the DPOCC framework and followed the steps. However, upon completing the implementation, the framework was disclosed after the management had expressed satisfaction with the implementation outcomes. The non-disclosure approach at the beginning was used because it was unclear how the management of the businesses would feel and respond about using their businesses in an experiment with a new, untested framework for their DT objectives.

The researcher had separate meetings with the management of all three companies, discussing the purpose of the DT attempt, their anticipated outcomes, and their internal or external drives. Based on the DPOCC framework, the researcher suggested the implementation approaches regarding the processes to be emphasised and optimised. After several deliberations, specific processes were accentuated, and some drivers were enhanced. Finally, a competence and resource assessment were conducted to factor the organisations' capabilities and capacities in the framework to see their influence on the drivers, processes, and outcomes. Recommendations were then made regarding the competencies and resources to harness.

The researcher spearheaded and managed the system selection, implementation, and training for all three companies. The researcher's direct involvement in the system's selection decision, implementation, and training, together with the timing of the entire operation, at the end of the research study, created the opportunity and allowed the researcher to evaluate the developed theoretical and practice-based DPOCC framework. The DPOCC framework was introduced and explained to the management of all three companies only after successfully implementing the system and training the personnel. They admired and commended the effort despite the surprise.

### 8.4.2 Case Analysis of the Companies for the Framework Evaluation

Brief profiles of the three firms, their previous and existing systems' challenges, the anticipated system requirements and functionalities and the proposed system are summarised and presented in Table 8.1.

**Table 8.1 The Case Analysis of the Companies for the Framework Evaluation**

Case	Case 1	Case 2	Case 3
Company	PF Ltd	EAC Ltd	GL Ltd
<i>Location</i>	Kumasi, Ghana	Accra, Ghana	Kumasi, Ghana
<i>Business Type</i>	Manufacturer, Distributor	Distributor	Importer, Distributor
<i>Agency / Representation</i>	Key supplier for the World Food Programme (WFP)	Key distributor for Guinness Ghana Ltd	Key distributor for Mactex oil
<i>Spread</i>	Two Manufacturing Plants	Two Distribution Outlets	One Distribution Outlet
<i>Product</i>	Cereal and Legume products	Alcoholic and Non-Alcoholic Beverages	Vehicle and Machine Oils and Lubricants
<i>Market</i>	Local and International	Ghana (Accra only)	Ghana (Nationwide)
<i>Previous system</i>	Tally software, spreadsheets, manual	QuickBooks software, spreadsheets, manual	Inflow inventory software, spreadsheets, manual
<i>Challenges</i>	No automated manufacturing system. Had no system for Fixed Assets and Human Resources Management. Not able to work remotely.	No concurrent multi-location operation. Operational data is split into different databases. Inconsistent and wrong customer and stock balances. Parallel manual data records	Manual accounting, fixed assets, and payroll systems, with attending difficulties. Inability to monitor and control salespeople in the field
<i>System requirements</i>	Integrated system for manufacturing, inventory control, accounting, fixed assets, and human resource.	System for a multi-location operation to control multiple branches with real-time and concurrent data entries	System to manage salespeople remotely, Allow dedicated clients to place orders online, Fully manage accounting, fixed assets, and payroll with one system
<i>Essential functionalities</i>	Integrated manufacturing system Work from home, anywhere, any time, and on any device	Multi-location, multiple branches Real-time and concurrent data entries, Single system rather than multiple split systems. Monitor operations remotely	Procurement control with online ordering Automated reports emailing Electronic approval of transactions, The comprehensive system at a reasonable cost
<i>System implemented</i>	Ecount ERP Online Software	Ecount ERP Online Software	Ecount ERP Online Software
<i>Relevant Modules and Features of the Proposed System</i>	Inventory, Manufacturing, Accounting, HR, Collaboration Online, Web-based, Multi-location, Multi-user	Inventory, Accounting, HR, Collaboration Online, Web-based, Multi-location, Multi-user	Inventory, Accounting, HR, Collaboration Online, Web-based, Multi-location, Multi-user

### 8.4.3 The DPOCC Framework Approaches for the System Implementation

The DPOCC Framework Approaches used for implementing the system for the post-study evaluation with the three companies and the steps involved are summarised and presented in Table 8.2.

**Table 8.2 The DPOCC Approaches Used for the System Implementation**

Case	Case 1	Case 2	Case 3
Company	PF Ltd	EAC Ltd	GL Ltd
DPOCC Approach	<u>DRIVER-LED APPROACH</u>	<u>DRIVER-LED APPROACH</u>	<u>OUTCOME-LED APPROACH</u>
Focus of approach	External, organisational and work task drivers	External, organisational and technological drivers	Customer satisfaction, business image, productivity and profitability
Step 1	<b>Drivers Identified</b>  Technological features, External environment, Organisational system Work tasks New rules and resources	<b>Drivers Identified</b>  Technological features, External environment, Internal system Emergent outputs Resources	<b>Outcomes Specified</b>  Cost reduction with increased productivity and profitability, Satisfy customers' need to place sales orders online. Enhancing business image and value
Step 2	<b>Processes Determined</b>  Implementation and use, Changes in Function and Resources Adjustment and Adaptation	<b>Processes Determined</b>  Decision-making and adoption, Implementation and use, Adjustment and Adaptation	<b>Processes Determined</b>  Decision-making and adoption, Adjustment and Adaptation Strategic shifts and positioning
Step 3	<b>Outcomes Achieved</b>  Enhanced work patterns, Ease of working Improvement in task performance and effectiveness Simplification of jobs The flexibility of work and end-to-end workflow	<b>Outcomes Achieved</b>  Flexibility in work and task performance Improving data reliability and consistency. Reducing operating costs Increasing productivity Increased profitability, Reduced losses.	<b>Drivers Identified</b>  Technological features, External environment, Emergent outputs New rules and resources.
Step 4	<b>Capabilities and Capacities considered</b>  Managerial cognition, Managerial human capital, Managerial social capital, Organisational capability Organisational capacity	<b>Capabilities and Capacities considered</b>  Managerial cognition, Managerial human capital, Managerial social capital, Organisational capability Organisational capacity	<b>Capabilities and Capacities considered</b>  Managerial cognition, Managerial human capital, Managerial social capital, Organisational capability Organisational capacity
Completion Period	24 weeks	18 weeks	12 weeks

#### 8.4.4 The Feedback and Lessons from the System Implementation

The implementations of the online ERP system were successfully done for all three companies. The ERP system impeccably met all the individual requirements of the three companies. The response and involvement of both management and staff were very encouraging. Using the DPOCC framework promoted and encouraged interactions among the system implementer/consultant (researcher), management, and staff. Such interactions occurred because specific things needed to be looked for and worked on. This relates to drivers to pursue, processes to use, outcomes to anticipate and capabilities and capacities to consider.

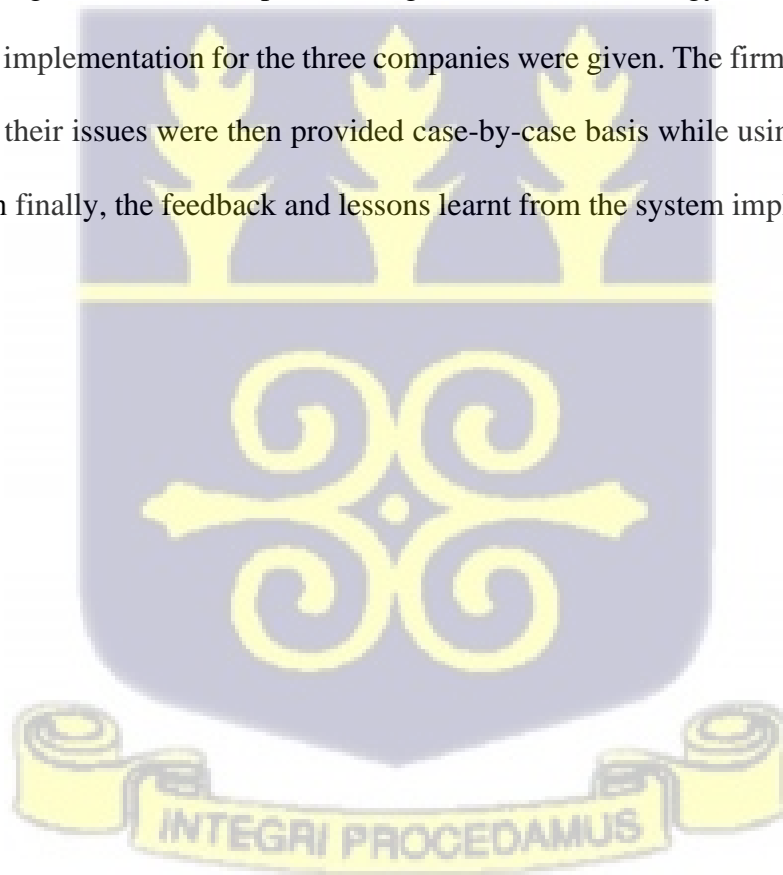
The cooperation and understanding of management and staff, coupled with their desire to achieve the expected outcomes, facilitated the smooth system implementation, digitalisation, and DT. The success of the implementation and the post-study evaluation of the DPOCC framework were reflected in the initial signs of achieving each company's intended outcomes. Each company's management was satisfied with the implementation approach and the framework's guide in determining what, where, why, when, and how to emphasise and optimise. The satisfaction was personally expressed with appreciation by the CEOs of each company. The evidence of the satisfaction was shown by the CEO of EAC Ltd, who also requested a similar approach to be used for his new Fan Milk distribution business, requiring a system for operation.

Overall, the system's decision, implementation, and digitalisation processes took a shorter time of three to six months to complete for all three businesses. Meanwhile, for SMEs, the implementation duration for ERP systems varies from six to 12 months based on the requirements and the number of processes that need to be covered (Globalteckz, 2020). However, implementing ERP projects for medium to large enterprises takes anywhere from 6

months to 2 years (Archerpoint, 2015). The shorter period for completing the implementation implied that the DPOCC framework facilitated effective and efficient system implementation with the cooperation and understanding of all stakeholders.

## 8.5 Chapter Summary

This chapter presented the post-study evaluation of the developed framework for DT. The purpose of the evaluation and the two approaches were given. The details of the methodology employed in the workshop and the corresponding feedback and lessons were also presented. The media coverage of the workshop was also given. The methodology and case presentation for the system's implementation for the three companies were given. The firms' challenges and the solutions to their issues were then provided case-by-case basis while using the framework as a guide. Then finally, the feedback and lessons learnt from the system implementation were also presented.



## CHAPTER NINE

### 9 SUMMARY, CONTRIBUTIONS AND CONCLUSIONS

#### 9.1 Chapter Overview

This chapter summarises the entire research work in five sections. The first section summarises the research activities undertaken. The second section summarises the research findings, discussions, and framework development and shows how the findings respond to the research questions and gaps. The third discusses the validity and reliability of the study. The fourth section presents the study's contribution to research, practice, and policy. The fifth section provides recommendations for future studies.

#### 9.2 Summary of the Research Activities

This research purposed to explore the drivers, processes and outcomes of DT and the inter-relationships among them while considering the influence of the SMEs capabilities and capacities in DCs. The research activities were reported in eight chapters. In the first chapter, the activities involved a review of the literature on DT and related subjects to get insight into the phenomenon of DT. Gaps were identified and summarised to constitute the basis of the research problem, objectives, and questions. The research context and significance were also discussed. The second chapter reviewed extant literature on DT concepts, digital technologies, DT drivers, processes, outcomes, SMEs capabilities and capacities, and DT of SMEs in DCs. This review broadened the understanding of the DT factors and contributed to developing the conceptual framework.

The third chapter reported activities relating to establishing the theoretical foundations of the study. Theories, models, and theoretical and conceptual frameworks were explained. The theoretical framework was developed from the AST, where its overview, constructs, criticism, prior research, and framework were discussed. The theoretical framework was further developed into the study's conceptual framework, where other literature and concepts were factored in. This framework helped determine the variables suitable for the study that formed the basis of the study's questionnaire and interview guide.

The fourth chapter reports the methodological approaches, where the qualitative Delphi technique with the CR philosophy was used to collect data from 16 DT experts selected from six DCs. Three sets of questionnaires and interview guides were prepared as data collection instruments to collect data relating to the three research questions in three rounds of Delphi. The data collected was analysed qualitatively with a developed analysis framework. In the data collection and other research approaches, validity and reliability were ensured amid other ethical considerations.

The findings were reported in the fifth chapter based on the study's objectives and the themes and dimensions identified from the analysis. The findings included a preliminary investigation of the typical digital technologies adopted and used in SMEs' DT in DCs. Meanwhile, the first objective findings identified the DT drivers, processes, and outcomes. The second objective findings comprised the relationships or influences among the drivers processes and outcomes. However, the third objective findings considered the SMEs capabilities and capacities in DCs and their influences on the drivers, processes and outcomes.

These findings were discussed according to the study's objectives and the themes obtained while relating and referencing the relevant extant literature, concepts, theories, and gaps. The discussions were reported in the sixth chapter. It involved separate discussions on the digital technologies deployed in the DT of SMEs in DCs and the drivers, processes and outcomes of DT of SMEs in DCs. The discussion involved the influences among the drivers, processes and outcomes. It also involved the influence of the SMEs capability and capacity of the drivers, processes and outcomes of the DT of SMEs in DCs.

The seventh chapter reports the development of the post-study framework from the findings and discussions. Seven different frameworks representing the different influences identified were developed. These effects involve the influence of drivers on processes and outcomes, processes on outcomes and outcomes on drivers, as well as the capabilities and capacities influence on the drivers, processes and outcomes. An integrated post-study theoretical and practice-based framework was developed to appreciate the interactions of the drivers, processes, outcomes, and capabilities and capacities. The developed framework was named the DPOCC Framework of DT.

The developed theoretical and practice-based framework (DPOCC Framework) was subjected to a post-study evaluation and reported in the eighth chapter. The evaluation was through a presentation to enterprise entrepreneurs and managers, as well as a practical ERP implementation was found to be very practical and valuable. The summaries of research activities, findings and responses to research questions were reported in the ninth chapter. A summary of the findings was presented in Section 9.3. Also, the study's contribution, recommendations for future studies, and conclusions were made.

### 9.3 Summary of Research Findings and Framework Development

The summary of the study's findings from the discussions, the resulting framework developed, and their respective responses to the research questions are presented as follows:

#### 9.3.1 Summary of Preliminary Findings: (Digital Technologies Used in DT)

##### **Findings 1: Digital Technologies**

Finding 1a: The *digital technologies more frequently used in the DT of SMEs* in DCs are of six dimensions, namely: mobile computing, desktop computing, cloud computing, social media platforms, e-commerce sites and virtual and remote communication systems.

Finding 1b: other digital technology types less frequently used in the DT of SMEs in DCs are also of six dimensions, namely: Big Data Analytics, Robotics and Drones, Internet of Things (IoT), Interactive AI, Design and Manufacturing systems, Blockchain.

Finding 1c: COVID-19 pandemic has caused increased use of digital technologies, especially the virtual and remote communication systems in SMEs of DCs.

#### 9.3.2 Summary of Research Questions Findings

The study purposed to explore the drivers, processes and outcomes of DT and the inter-relationships among them while considering the influence of the SMEs capabilities and capacities in DCs. The findings of this research appropriately address the research objectives and questions that flow from the purpose and meet the respective gaps while making core contributions to knowledge.

The findings in response to the research questions are summarised in table 9.1.

Table 9.1 Summary of Research Questions Findings

Research Objectives	Findings	Theoretical Artefacts Developed	Gap Addressed	Core Contribution
1. <i>To determine the drivers, processes, and outcomes of the DT of SMEs in DCs</i>	<p><b><u>Findings 2: Drivers of DT of SMEs</u></b></p> <p><b>Finding 2a:</b> the <b>significant drivers of DT of SMEs</b> in DCs are of six dimensions, namely: technological features, external environment, internal system, work tasks, emergent outputs, and new rules and resources.</p> <p><b>Finding 2b:</b> The technological features are classified as dynamic, steady and spirit features, and this classification is novel in literature.</p> <p><b>Finding 2c:</b> The work tasks, the emergent outputs and the new rules and resources are new typologies hitherto absent in the literature.</p>	Typology of Drivers of DT of SMEs in DCs (See Table 6.3 on Page 159)	<p>Lack of agreement on what constitutes DT drivers, processes, and outcomes (Liere-Netheler et al., 2018)</p> <p>Calls for a review of DT drivers and outcomes (Indriastuti &amp; Kumar &amp; Ayedee, 2021; Priyono et al., 2020)</p>	<p>Unearthing the typologies of the DT drivers, processes, and outcomes offer new insight for studying DT</p> <p>The identification of six dimensions of drivers of DT is unique for DT research as extant literature does not have all such dimensions.</p> <p>The technology, organisational and environmental-related drivers are known driver dimensions (Al Maamari &amp; Bhuiyan, 2021; Lutfi et al., 2022), but the work tasks, emergent outputs and the new rules &amp; resources as drivers of DT are new dimensions identified in the study that hitherto were absent in the literature</p>
	<p><b><u>Findings 3: Processes of DT of SMEs</u></b></p> <p><b>Finding 3a:</b> the <b>major processes required for the DT of SMEs</b> in DCs, have five sequential dimensions, namely: decision-making and adoption, implementation and use, changes in function and resources, adjustment and adaptation, and strategic positioning and shift.</p> <p><b>Finding 3b:</b> These five stepwise and sequential DT processes, from decision-making to strategic direction, collectively have no equivalent precedence in literature. Though application may vary in practice, the sequential nature is being advocated as an adaptable guide.</p> <p><b>Finding 3c:</b> The changes in function and resources are of two types: operational and structural.</p>	Typology of Processes of DT of SMEs in DCs (See Table 6.4 on Page 165)	<p>The need for periodic reviews is due to the rapid changes in digital technologies and the dynamic nature of DT, resulting in changing drivers, processes, and outcomes over time (Châlons &amp; Dufft, 2017).</p> <p>Lack of studies and recommendations for further studies (Mahmood et al., 2019),</p>	<p>The technological features, classified as dynamic, steady and spirit features, are also novel in literature.</p> <p>This study's findings clearly outline five DT processes: which guide DT Research and Practice, with no precedence in literature.</p> <p>Most DT studies do not clearly define stepwise and sequential processes that begin with decision-making and end with strategic direction (Priyono et al., 2020; Delgado, 2017).</p> <p>The sub-dimensions of operational and structural</p>

	<p><b><u>Findings 4: Outcomes of DT of SMEs</u></b></p> <p><b>Finding 4a:</b> The key <b>outcomes of DT of SMEs</b> in DCs have six dimensions, namely: business image and value, work processes and function, resources and abilities improvements, customer and stakeholder satisfaction, productivity and profitability and undesirable consequences of technology use.</p> <p><b>Finding 4b:</b> These six dimensions of DT outcomes represent all the possible dimensions of DT outcomes in the literature.</p> <p><b>Finding 4c:</b> Most DT outcomes have positive effects (the first five dimensions). However, some outcomes have adverse effects (the sixth dimension) involving additional cost burdens, resource and skills obsolescence and loss, and security and risks.</p>	<p>Typology of Outcomes of DT of SMEs in DCs (See Table 6.5 on Page 171)</p>		<p>for the changes in functions &amp; resources processes are novel.</p> <p>The six dimensions of outcomes, including undesirable consequences, represent outcomes of DT and are scarcely mentioned in the literature (Bui, 2021; Chen et al., 2016; Lukonga, 2020).</p>
<p>2.</p> <p><i>To examine the influences among the drivers, processes, and outcomes in the DT of SMEs in DCs</i></p>	<p><b><u>Findings 5: Drivers influence Processes</u></b></p> <p><b>Finding 5a:</b> <b>DT drivers have the disposition to directly influence the DT processes to pursue in the DT of SMEs</b> in DCs.</p> <p><b>Finding 5b:</b> The influences of the DT drivers on processes are not general; rather, different driver dimensions influence distinct process dimensions.</p> <p><b>Example:</b> Technological features as drivers influence the decision-making and adoption, implementation and use, and adjustment and adaptation processes, while work tasks as drivers influence the changes in function and resources, processes alone.</p>	<p>Typology of Influence of Drivers on Processes of DT of SMEs in DCs (See Table 6.6 on Page 174)</p>	<p>No study examines the interrelationships among DT drivers, DT processes, and DT outcomes (Liere-Netheler et al., 2018; Hrustek et al., 2019; Reis et al., 2018).</p> <p>The need to determine the influence of drivers of DT outcomes is necessary, yet literature lacks it (Osmundsen et al., 2018; Parida et al., 2019).</p>	<p>The study reveals the relationships and influences among the drivers, processes and outcomes factors.</p> <p>The relationships discovered the influencing effect of drivers on processes and outcomes, processes on outcomes and outcomes on drivers. These influences were hitherto not established in literature. (Osmundsen et al., 2018; Parida et al., 2019).</p> <p>Since the observed influences are not general but specific with unique characteristics, the research framework</p>

<p><b><u>Findings 6: Drivers Influence Outcomes</u></b></p> <p><b>Finding 6a: DT drivers have the propensity to directly influence the nature of DT outcomes resulting from the DT of SMEs in DCs.</b></p> <p><b>Finding 6b:</b> The influences of the DT drivers on outcomes are not general; rather, different driver dimensions influence distinct outcomes dimensions.</p> <p><b>Example:</b> Technological features drivers influence the work processes and function, business image and value, productivity and profitability, and outcomes, while the new rules and resources, as drivers, influence the productivity and profitability and work processes and function, outcomes only.</p>	<p>Typology of Influence of Drivers on Outcomes of DT of SMEs in DCs (See Table 6.7 on Page 177)</p>	<p>Mere identification of factors is not enough to understand DT, but their influences are key ((Hrustek et al., 2019; Liere-Netheler et al., 2018)</p> <p>DT drivers are customer-driven, technology-driven, and organisational-driven and can influence DT outcomes and create business models differently. (Hrustek et al., 2019; Muditomo &amp; Wahyudi, 2021)</p>	<p>can guide further research into unearthing more specific relationships among the factors, depending on which factors and dimensions apply in peculiar situations for different SMEs.</p>
<p><b><u>Findings 7: Processes Influence Outcomes</u></b></p> <p><b>Finding 7a: DT processes inclined to directly influence the nature of DT outcomes resulting from the DT of SMEs in DCs.</b></p> <p><b>Finding 7b:</b> The influences of the DT processes on outcomes are not general; rather, different process dimensions influence distinct outcomes dimensions.</p> <p><b>Example:</b> Decision-making and adoption processes influence productivity and profitability, customer and stakeholder satisfaction, and business image and value outcomes, while strategic shift and positioning processes influence the business image and value and productivity and profitability outcomes.</p>	<p>Typology of Influence of Processes on Outcomes of DT of SMEs in DCs (See Table 6.8 on Page 179)</p>		
<p><b><u>Findings 8: Outcomes influence Drivers</u></b></p> <p><b>Finding 8a: DT outcomes tend to directly influence the DT drivers of the DT of SMEs in DCs.</b></p> <p><b>Finding 8b:</b> The influences of the DT outcomes on drivers</p>	<p>Typology of Influence of Outcomes on Drivers of DT of SMEs in DCs (See Table 6.9 on Page 182)</p>		

	<p>are not general; rather, different outcomes dimensions influence distinct driver dimensions.  <u>Example:</u> Work processes and function outcomes influence the work tasks and internal system drivers, while customer and stakeholder satisfaction outcomes only influence the external environmental drivers.</p>			
<p>3.   <i>To understand the influence of SMEs capabilities and capacities on the drivers, processes, and outcomes of the DT in DCs</i></p>	<p><b><u>Findings 9: Capabilities and Capacities</u></b></p> <p><u>Finding 9a:</u> The <b>capabilities and capacities of SMEs involved in DT</b> are of four dimensions, namely: managerial capabilities, managerial capacities, organisational capabilities, and organisational capacities.  <u>Finding 9b:</u> the capabilities and capacities for both the managerial and organisational dimensions can be classified as either intrinsic or extrinsic.  <u>Finding 9c:</u> the managerial capabilities are of four types of intrinsic attributes, extrinsic attributes, extrinsic relationships, and intrinsic relationships, and this classification is hitherto non-existent in literature.</p>	<p>Typology of Capabilities and Capacities of SMEs in DT of SMEs in DCs (See Table 6.10 on Page 187)</p>	<p>We need to consider the DT approaches and effects in different situational contexts. (Berghaus and Back, 2017)</p> <p>Current studies on DT in SMEs are silent on how the capabilities and capacities of firms influence DT drivers, processes, and outcomes (Muditomo &amp; Wahyudi, 2021; Tarutè et al., 2018)</p>	<p>The SMEs capabilities and capacities, both managerial and organisational, influenced the drivers, processes and outcomes.</p> <p>The integrated framework can study and research these multiple factors in DT, involving drivers, processes, outcomes of the DT and firms' capabilities and capacities, and their influences and relationships.</p> <p>The study further identifies a novel classification of capabilities and capacities into intrinsic and extrinsic, and managerial capabilities as attributes and relationships, which can also be considered during DT research.</p>
	<p><b><u>Findings 10: Capabilities and Capacities influence Drivers</u></b></p> <p><u>Finding 10a:</u> <b>SMEs capabilities and capacities can influence the dimensions of drivers of DT.</b>  <u>Finding 10b:</u> The influences of the SMEs capabilities and capacities on DT drivers are not general; rather, different capabilities and capacities dimensions influence distinct driver dimensions.  <u>Example:</u> Managerial capabilities influence the internal system and new rules and resources, drivers, whereas organisational capacities influence the internal system and work tasks, drivers.</p>	<p>Typology of Influence of SMEs capabilities and Capacities on Drivers of DT of SMEs in DCs (See Table 6.11 on Page 189)</p>	<p>Understanding the influence of SMEs capabilities and capacities on DT serves as a strategic assessment of how to approach DT and achieve the expected outcomes (Nambisan et al., 2019; Zhang et al., 2022).</p> <p>The need for further research in tackling other aspects of DT, like organisational structure,</p>	<p>The findings offer the opportunity to know which capabilities and capacities to leverage and infuse and how they influence the drivers and processes to achieve the desired outcomes.</p> <p>All these factors and typologies could be explored better with the study's developed DT framework, which would help reveal the relationships among them and contribute to</p>

<p><b><u>Findings 11: Capabilities and Capacities influence Processes</u></b></p> <p><b><u>Finding 11a: SMEs' capabilities and capacities influence the dimensions of processes of DT.</u></b></p> <p><b><u>Finding 11b:</u></b> The influences of the SMEs capabilities and capacities on DT processes are not general; rather, different capabilities and capacities dimensions influence distinct processes dimensions.</p> <p><b><u>Example:</u></b> While managerial capacities influence the decision-making and adoption, implementation and use, and adjustment and adaptation, the organisational capacity influences the changes in function and resources, adjustment and adaptation, and strategic shifts and positioning.</p>	<p>Typology of Influence of SMEs capabilities and Capacities on Processes of DT of SMEs in DCs (See Table 6.12 on Page 192)</p>	<p>capacities, capabilities, and their d its influence on DT (Issa et al., 2018; Li et al., 2018; Vial, 2019).</p>	<p>research that seeks to understand the relationships, as there is a lack of such studies currently (Liere-Netheler et al., 2018; Hrustek et al., 2019; Reis et al., 2018).</p>
<p><b><u>Findings 12: Capabilities and Capacities Influence Outcomes</u></b></p> <p><b><u>Finding 12a: SMEs capabilities and capacities can influence the dimensions of outcomes of DT.</u></b></p> <p><b><u>Finding 12b:</u></b> The influences of the SMEs capabilities and capacities on DT outcomes are not general; rather, different capabilities and capacities dimensions influence distinct outcomes dimensions.</p> <p><b><u>Example:</u></b> The managerial capacities influence the resources and abilities improvements, work processes and function, whereas the organisational capacities influence only the resources and abilities improvements, productivity and profitability, business image and value, and undesirable consequences.</p>	<p>Typology of Influence of SMEs capabilities and Capacities on Outcomes of DT of SMEs in DCs (See Table 6.13 on Page 195)</p>		

### 9.3.3 Summary of Frameworks Developed for DT

A **post-study framework** of DT of SMEs that conceptualises the drivers, processes and outcomes of DT and their relationships and the influence of SMEs capabilities and capacities was developed. It shows how drivers influence processes; drivers influence outcomes, processes influence outcomes, and outcomes influence drivers. It also shows how SMEs capabilities and capacities influence the drivers, processes, and outcomes.

A **theoretical and practice-based framework** of DT for SMEs was also developed out of the post-study framework. Such a framework suits entrepreneurs, managers, business practitioners, and IT professionals. This framework was described as the Drivers-Processes-Outcomes-Capabilities-Capacities Framework (DPOCC Framework). It helps determine the appropriate driver to pursue, processes to optimise, outcomes to expect, and the capabilities and capacities to enable them.



## 9.4 Validity and Reliability of Findings

The entire research methodology was subjected to validity and reliability as accustomed to qualitative research. The research philosophy, approach, design, sampling, data collection, and analysis were tailored toward achieving validity and reliability (Cohen et al., 2017). Meanwhile, *Reliability* in qualitative research concerns the consistency, stability and repeatability of the informant's accounts and the investigators' ability to collect and record information accurately. However, *Validity* in qualitative research concerns the accuracy and truthfulness of scientific findings (Cohen et al., 2017).

### 9.4.1 Reliability

The review and validation or field testing of the data collection instruments (questionnaire and interview guide) helped to establish the research design's reliability (McDonald et al., 2019). The questionnaire for the study was complemented with the interview to help achieve reliability. Triangulation is another aspect that becomes particularly important in establishing reliability in research (Morse et al., 2002). This study triangulated the research questionnaire with the interview to assure reliability (Hayashi et al., 2019; Morse et al., 2002). Reliability was then assured as the responses in the interview were not significantly different from the responses to the questionnaire. According to Rose and Johnson (2020), reliability occurs when a researcher obtains the same or comparable results every time different methods used on the same or comparable subjects yield the same results. In qualitative research, reliability is all about consistency in responses and outcomes. Reliability was also assured between the Delphi rounds 2 and 3 responses, where there was no difference in feedback with the final member check for all the findings. Hence there was consistency (Koelsch, 2013; Koelsch, 2018).

When the research philosophy focuses on unearthing mechanisms behind structures and phenomena, the reliability of the exploration is ensured. This principle holds especially when the philosophies and objectives align (Hayashi et al., 2019). Critical realism was qualitatively used to explore how the DT's drivers, processes, outcomes and SMEs capabilities and capacities relate to and influence one another in the structures and phenomenon of DT of SMEs in DCs. Therefore, the research approach was very reliable. Regarding sampling, the Purposive selection of experts from different income groups and geographic clusters or regions of DCs broadens the experts' views and experiences. This wide variety contributes to the generalisability and reliability of the responses and, for that matter, the study's findings. Using the expert panel in the multiple rounds of Delphi questioning reinforced responses that inured reliability in the findings (Habibi et al., 2014).

#### 9.4.2 Validity

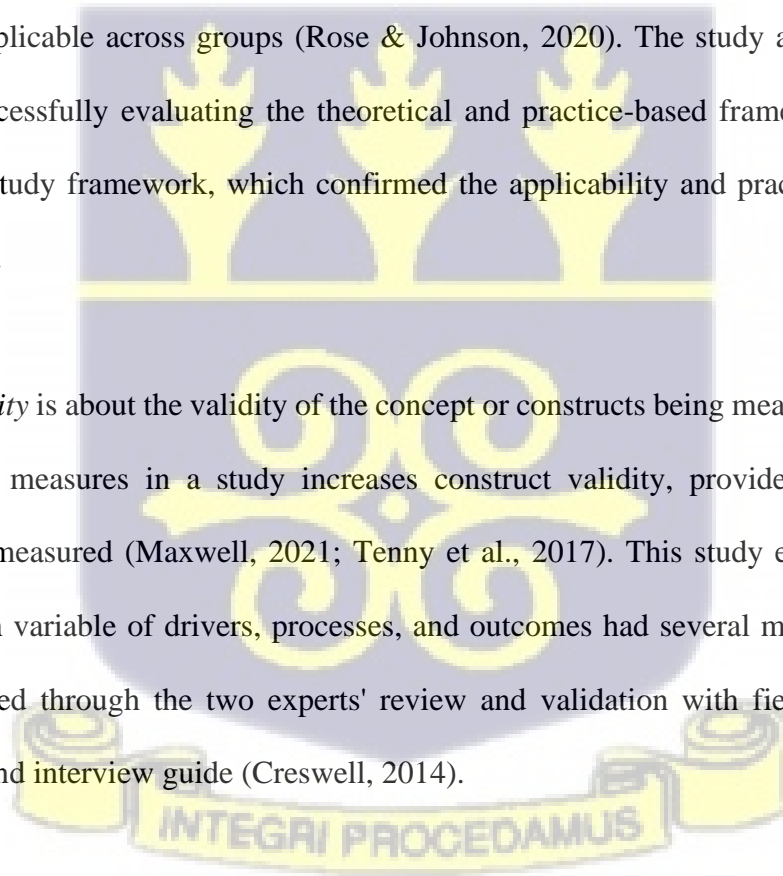
The study's validity was ensured by unearthing and demonstrating the existing DT mechanisms (Rose & Johnson, 2020). The data collection instruments also helped achieve the study's objectives by revealing the truths about the DT phenomenon (Rose & Johnson, 2020). Validity relates to the appropriateness of any research value, tools, techniques, and processes, including data collection, validation, and conclusions (Mohamad et al., 2015). The validity of this study is expressed in the distinct types of internal, external and construct validity.

*Internal validity* is about the validity of results within or internal to a study. It also refers to the extent to which research findings are a true reflection or representation of reality rather than the effects of extraneous variables (Rose & Johnson, 2020). The internal validity of the responses was assured as the broad knowledge and experiences of the experts made their responses very dependable. The iterative cycles of the Delphi method also ensured data and

response validations, as some form of consensus was established by the third round of Delphi through respondents' validation as the final member check (Aungsuroch et al., 2020; Koelsch, 2018). Hayashi et al., 2019, confirm the need to have consensus among the individual to help establish the correctness and accuracy of the Delphi research. The data collection instruments' review and validation or field testing also helped increase the validity of the research questions (Creswell, 2014).

On the other hand, *external validity* is about applying the study's conclusions outside or external to the study's setting. Another term for this is generalisability. External validity addresses the degree or extent to which such representations or reflections of reality are legitimately applicable across groups (Rose & Johnson, 2020). The study achieved external validity by successfully evaluating the theoretical and practice-based framework developed from the post-study framework, which confirmed the applicability and practicality (Rose & Johnson, 2020).

*Construct validity* is about the validity of the concept or constructs being measured. Increasing the number of measures in a study increases construct validity, provided that the same constructs are measured (Maxwell, 2021; Tenny et al., 2017). This study ensured construct validity as each variable of drivers, processes, and outcomes had several measures. Validity was also ensured through the two experts' review and validation with field testing of the questionnaire and interview guide (Creswell, 2014).



## 9.5 Contributions of the Study

The study significantly contributes to knowledge, practice, and policy in DT. The contributions manifest from unearthing typologies of DT drivers, processes and outcomes and the relationships among them while considering the influence of the SMEs capabilities and capacities in DCs, which resulted in framework development for DT. The study's contribution to knowledge is in the form of theoretical contribution, empirical or research contribution and literature contribution. Other contributions are also made to practice and policy.

### 9.5.1 Contribution to Theory

The study makes *a theoretical contribution by developing* the theoretical and practice-based framework for DT. The DPOCC framework, having been conceptualised from the adaptation of an existing theory, the AST, and further evaluated practically, helps to reshape and enhance the propositions and constructs of the AST for DT studies specifically. Regarding theory development, the conceptualisation of the framework explains DT drivers, processes and outcomes and their typologies. For theory refinement, the study enhances the rigour around the AST and places it in perspective for contemporary application, especially for DT. The DPOCC framework can be used to study multiple factors in DT, involving drivers, processes, outcomes, firms' capabilities and capacities, and their influences and relationships.

### 9.5.2 Contribution to Research

The study makes *an empirical contribution* by unearthing the typologies of the DT drivers, processes, and outcomes and further revealing the relationships and influences among these factors and the influence of SMEs capabilities and capacities on the factors. These findings offer new insight for studying DT.

The identification of six dimensions of drivers of DT is unique for DT research as extant literature does not have all such dimensions. The technology, organisational and environmental drivers are known driver dimensions (Al Maamari & Bhuiyan, 2021; Lutfi et al., 2022). However, the work tasks, emergent outputs and the new rules and resources as drivers of DT are new dimensions identified in the study that hitherto were absent in the literature. Meanwhile, the technological features are classified as *dynamic*, *steady* and *spirit* features, and this classification is also novel in literature. These typologies, therefore, offer new insight for studying the drivers of DT.

Most DT studies do not clearly define stepwise and sequential processes that initiate decision-making and end with a strategic direction (Priyono et al., 2020; Delgado, 2017). However, this study's findings clearly outline five stepwise and sequential DT processes: decision-making and adoption through implementation, changes to functions and resources, adjustments and adaptations, and strategic shifts and positioning, which guide research. These five stepwise processes of DT collectively have no equivalent precedence in literature. For the processes, the identified sub-dimensions of *operational* and *structural* changes for the changes in function and resources are novel and facilitate research into the fundamental change that DT assumes.

The determined outcomes of DT from the study offer a unique set of six DT outcomes dimensions, namely: business image and value, work processes and function, resources and abilities improvements, customer and stakeholder satisfaction, productivity and profitability and undesirable consequences of technology use (Bui, 2021; Mubarak et al., 2019; Yousaf et al., 2021). Meanwhile, the first five have a positive effect, while the sixth one, the undesirable consequences, negatively affects the organisation. Moreover, these six DT outcomes represent outcomes as presented in extant literature (Bui, 2021; Chen et al., 2016; Lukonga, 2020;

Mahmood et al., 2019; Mubarak et al., 2019; Verina & Titko, 2019). These typologies offer the opportunity to study and understand DT outcomes.

The relationships among the factors that the study discovered involved the influence of drivers on processes and outcomes, processes on outcomes and outcomes on drivers. Moreover, the SMEs capabilities and capacities were also found to influence the drivers, processes, and outcomes. These influences were hitherto not established in literature. The study further identifies a novel classification of capabilities and capacities into *intrinsic* and *extrinsic*, and managerial capabilities as *attributes* and *relationships*, which can also be considered during DT research.

The factors and typologies could be explored better with the study's developed DT framework. The framework would help reveal the relationships among the factors and contribute to research that seeks to understand the relationships, as there is a lack of such studies in literature (Liere-Netheler et al., 2018; Hrustek et al., 2019; Reis et al., 2018). Since the observed influences are not general but specific with unique characteristics, the research framework can guide further research into unearthing more specific relationships among the factors, depending on which factors and dimensions apply in peculiar situations for different SMEs.

### **9.5.3 Contribution to Literature**

The study contributes to the body of literature, as seven publications have resulted from the study. The stud's contributions have been published as two journal articles, three book chapters and two conference papers. The publications are listed in Appendix 8.

The journal article “Digital transformation process and the capability and capacity implications for small and medium enterprises” was published in the *International Journal of E-Entrepreneurship and Innovation* (IJEI) in 2020. It shows how the capability and capacity of SMEs directly influence DT processes. The journal article “Doctorpreneurship in the Digital Age: Perspectives from Ghana’s Health Sector” was published in the *International Journal of E-Entrepreneurship and Innovation* (IJEI) in 2021. It shows how medical practitioners could pursue some DT in the health sector and describes it as *Doctorpreneurship*.

The book chapter titled “Drones in the Digital Transformation of Healthcare Delivery in Africa” in the book *Digital Innovations, Business and Society in Africa* was published by Springer in 2022. It shows how Drones as digital technologies are being used to transform and facilitate healthcare delivery, particularly in Africa digitally. Another book chapter, “Dealing with the Unexpected: Exploring the Unintended Negative Consequences of Digitalisation in Africa’s Healthcare Industry”, in the book *Digital Innovations, Business and Society in Africa*, was also published in 2022. This book chapter discusses the unintended consequences of DT as it relates to Healthcare in Africa. The unintended consequence was one of the typologies of outcomes revealed in the study. Still another book chapter titled “Organisational Transformation in Developing Economies by New and Emerging Information Systems: The Usage, Transformations, Impacts, Benefits, and Management” in the book *Handbook of Research on Managing Information Systems in Developing Economies* published by IGI Global in 2020. This book chapter discusses the new and emerging digital technologies and how they transform organisations in DCs.

The conference paper, “Digital entrepreneurship in business enterprises: A systematic review”, published in the conference proceedings on *e-Business, e-Services, and e-Society* (CEEE), was

published by Springer in 2020. This paper is a systematic review of DT and digital entrepreneurship journal articles from 2013–2018. Another conference paper, "Adoption of Mobile Pedigree as an Anticounterfeiting Technology for Pharmaceuticals in Developing Countries, " is published by AIS in *Proceedings of the 25th Americas Conference on Information Systems, AMCIS 2019*. This paper demonstrates how digital technology can be used in the pharmaceutical industry to check the counterfeiting of medicines.

#### 9.5.4 Contribution to Practice

The study's *contribution to practice* is established in the opportunities for SME entrepreneurs, managers, and employees to appreciate and understand the drivers, processes, and outcomes of DT and their interrelationships. It also helps to appreciate SMEs capabilities and capacities' influence on DT drivers, processes and outcomes. The developed theoretical and practice-based DT framework (DPOCC Framework) and the identified factors and typologies will help address SMEs' DT concerns and facilitate solutions to questions such as the following:

- i. What are the drivers, processes, and outcomes of the DT of SMEs in DCs?
- ii. How do the dimensions of drivers, processes, and outcomes influence one another in the DT of SMEs in DCs?
- iii. What are the capabilities and capacities of SMEs for DT in DCs?
- iv. How do the SMEs capabilities and capacities affect the type of drivers, processes, and outcomes in the DT of SMEs in DCs?
- v. If DT's specific outcomes are desired, what drivers, processes, capabilities, and capacities should be considered to achieve the outcomes?
- vi. If particular drivers push a firm to go for DT, what processes should be optimised, and what outcomes should be expected?

Thus, this study's findings and the simplified two-pronged approaches of the DPOCC Framework (*driver-led* and *outcome-led*) offer SME owners, entrepreneurs, and practitioners the opportunity to examine and improve their DT practices critically. This improvement is achieved by pursuing specific drivers and processes when particular outcomes are desired and optimising specific processes to get particular outcomes when pertinent drivers are pursued. It also offers the opportunity to know which capabilities and capacities to leverage and infuse and how they influence the drivers, processes and outcomes to ensure the success of the DT.

According to Delgado (2017, p. 3), "before starting DT, each organisation must be able to understand 'why' (drivers and goals), 'what' (relevant concerns) and 'how' (activities to conduct) to perform the Digital Transformation" successfully. Applying Delgado's (2017) principle to this study, it can be inferred that the *why* (drivers and goals) imply *drivers and outcomes*, *what* (relevant concerns) refer to *capabilities and capacities*, and *how* (activities to perform) denote the *processes*. Meanwhile, "such information allows the organisation to develop a map of their desired transformation, with an identified destination" (Delgado, 2017, p. 3). Further, "the need for such a map is essential because digital transformation is not a light endeavour which organisations can pursue blindly and unprepared" (Delgado, 2017, p. 3). Therefore, this study's framework (DPOCC Framework) provides the map which is needed to guide the trajectories and success of DT.

The successful post-study evaluation of the theoretical and practice-based framework (DPOCC Framework) for the DT of SMEs affirmed the contribution to practice. This evaluation was conducted in two approaches, one through a workshop with entrepreneurs and managers and the other through the practical implementation of an online ERP system for the DT of three companies. The workshop was remarkably successful, portraying a lot of understanding and

appreciation by business practitioners. The system implementation and digitalisation processes were smooth and timely, with much cooperation and understanding from management and employees. The successful evaluation of the theoretical and practice-based framework (DPOCC framework) confirms its validity and usefulness for the DT of SMEs in DCs.

### **9.5.5 Contribution to Policy**

Policy-wise, the findings guide stakeholders such as government, regulators, industry groups and other interest bodies to appreciate what drives or motivates DT. It also guides the processes needed to achieve DT and the anticipated outcomes of successful DT for SMEs. These bodies would then understand, guide, and champion the course for SMEs' DT in developing economies through policy and other interventions with the DPOCC framework. Policymakers will also appreciate how managerial and organisational capabilities and capacities could influence SMEs' DT drivers, processes, and outcomes. Meanwhile, SMEs' apparent limitations in managerial and organisational capabilities and capacities in DCs make the study's findings particularly useful and applicable to the DT of SMEs in DCs (Handoko et al., 2019).

Thus, strategic-level activities involving policy and intervention to improve digital technology use can be facilitated and informed by this study's findings and the theoretical and practice-based framework. It is recommended that policy and interventions be established to champion SMEs' DT to improve productivity, business image and value, and customer satisfaction and enable SMEs to contribute to economic growth. The DPOCC Framework can guide the current digitalisation efforts in government institutions and organisations, mainly state-owned enterprises. Such recommendations are particularly relevant now with the prevailing COVID-19 pandemic restrictions. The study, therefore, inures itself as a guiding solution for DT resulting from the restrictions and risk of the COVID-19 pandemic.

## 9.6 Recommendations for the Future

The study's findings show precise dimensions and typologies of DT's drivers, processes, and outcomes, with peculiar relationships and SMEs capabilities and capacities influence. The typologies unearthed include six types of drivers, five processes, six outcomes and four capabilities and capacities, with various relationships and influences. While the revelation of these typologies and relationships in the study makes several contributions to research, practice and policy, some inherent limitations may offer opportunities for further research studies. In addition, the findings, particularly the developed DPOCC framework, inure some recommendations for future DT practice and policy.

### 9.6.1 Recommendations for Future Research

For future research, the following recommendations are made regarding opportunities for future studies to help validate the findings or to use the findings as the basis or reference for other research in DT.

First, the developed framework can help understand how the influences among the typologies will play out in any DT study involving drivers, processes and outcomes. The identified new dimensions of drivers, which hitherto were absent in the literature: work tasks, emergent outputs and the new rules and resources, can be subjected to further studies for validation. The technological features drivers with the novelty classification as dynamic, steady and spirit features could also be exposed for future studies to verify if all technological features fall into those three categories. As most studies do not clearly define the processes of DT from decision-making to strategic direction, the identified five-step processes could be confirmed in future studies and used to study digitalisation processes in the future. Regarding outcomes, since undesirable consequences lack focus in extant literature, the six determined outcomes,

including the undesirable consequences, could be used in future studies to appreciate DT outcomes.

Second, the typologies and the developed framework can help understand how other enterprises, besides SMEs, like micro and large enterprises, undergo DT. These typologies can form the basis for assessing DT within enterprises with different contexts relating to culture, country, developmental level, ownership type, and industry. Hence, future studies can consider using the developed framework to understand the DT phenomenon, particularly the drivers, processes, outcomes, and relationships, while factoring in the influence of the capabilities and capacities of different firms of varying sizes, industries, and contexts. Future studies could be considered for micro and large enterprises, firms of different industry types, ownership types, varying cultures and in different countries, including developed countries.

Third, with a qualitative Delphi technique, these typologies were unearthed through the opinion of individual experts in DT. However, it will be interesting to know the perspectives and results of other methodological approaches like case studies of typical firms and quantitative evaluation of the determined typologies. Future studies can also focus on different methodological approaches, like case studies, design science research, and quantitative evaluation techniques. Such studies would broaden the conceptualisation and establish a reliable DT framework and model.

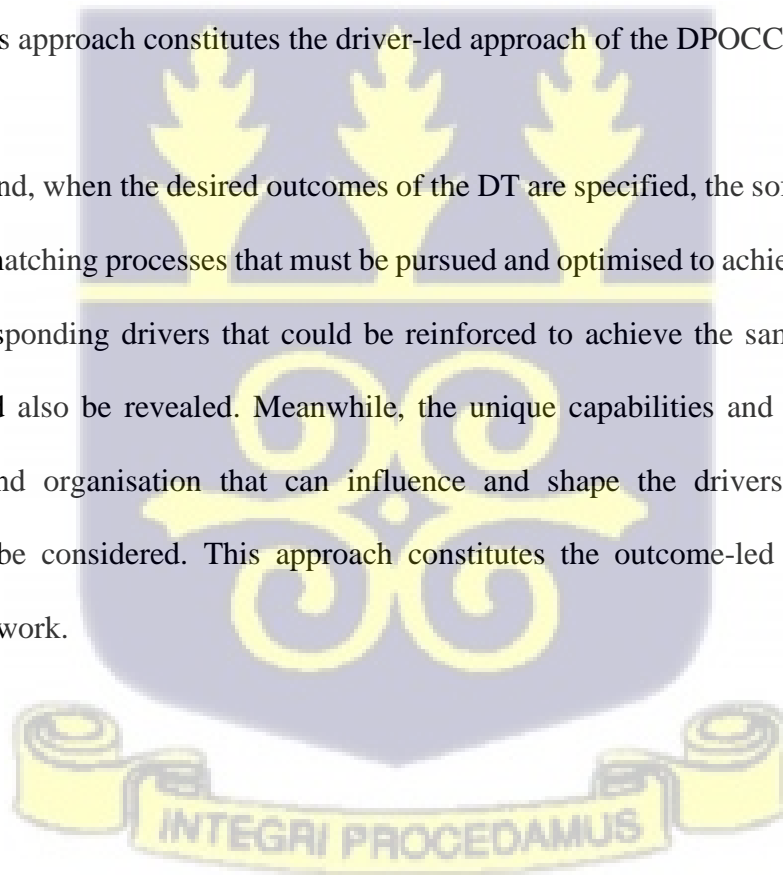
### **9.6.2 Recommendations for Future Practice and Policy**

For practice and policy, the developed DPOCC Framework could be developed into a manual or booklet to be used as a handy reference source for the DT of enterprises. The DPOCC Framework could also be developed as a software tool (for mobile and desktop computers)

tailored to guide enterprise systems policy decisions, proposal development, and systems integration and implementations. Practitioners (Entrepreneurs, Managers, IS Consultants, and System Implementers) and Policy-Makers (Government, Regulators, and Industry bodies) could use the booklet or software as guiding solutions for DT.

With such software, enterprises can identify and enter the compelling drivers of DT. The software could determine the matching processes to the drivers that must be pursued and optimised and the corresponding outcomes that could be achieved from both the drivers and processes. The unique capabilities and capacities of the management and organisation that can influence and shape the drivers, processes, and outcomes for a successful DT can then be considered. This approach constitutes the driver-led approach of the DPOCC Framework.

On the other hand, when the desired outcomes of the DT are specified, the software could help determine the matching processes that must be pursued and optimised to achieve the outcomes. Then the corresponding drivers that could be reinforced to achieve the same processes and outcomes could also be revealed. Meanwhile, the unique capabilities and capacities of the management and organisation that can influence and shape the drivers, processes, and outcomes can be considered. This approach constitutes the outcome-led approach of the DPOCC Framework.



## 9.7 Conclusion

In concluding the thesis, it is philosophised that:

Digital Transformation (DT) drivers, processes and outcomes interrelate with one another, and SMEs' capabilities and capacities also influence these factors.

Meanwhile, new typologies and classifications of DT drivers, processes, outcomes, SMEs capabilities, and capacities have been unearthed.

Moreover, a new theoretical and practice-based DPOCC Framework that guides DT research and practice, particularly for SMEs in Developing Countries, has been developed.



## REFERENCES

- Ab Wahid, R., & Aziidah Zulkifli, N. (2021). Factors affecting the adoption of digital transformation among SMEs in Malaysia. *Journal of Information Technology Management, 13*(3), 126-140. <http://10.22059/jitm.2021.83233>
- Abor, J., & Quartey, P. (2010). Issues in SME development in Ghana and South Africa. *International research journal of finance and economics, 39*(6), 215-228.
- Archerpoint (2015). How Long Should an ERP Implementation Take? <https://archerpoint.com/how-long-should-erp-implementation-take/>
- Achieng, M. S., & Malatji, M. (2022). Digital transformation of small and medium enterprises in sub-Saharan Africa: A scoping review. *The Journal for Transdisciplinary Research in Southern Africa, 18*(1), 13.
- Adner, R. & Helfat, C. E. (2003). Corporate effects and dynamic managerial capabilities. *Strategic Management Journal, 24*(10), 1011-1025. <https://doi.org/10.1002/smj.331>.
- Agnihotri, R. (2021). From sales force automation to digital transformation: how social media, social CRM, and artificial intelligence technologies are influencing the sales process. *A Research Agenda for Sales*. Edward Elgar Publishing. <https://doi.org/10.4337/9781788975315.00009>
- Agwu, E. (2018). Relevance of information technology in the effective management of selected SMEs in Lagos State, Nigeria. *Academy of Strategic Management, 17*(1), 1-15.
- Ahmad, S. Z., Bakar, A. R. A., & Ahmad, N. (2019). Social media adoption and its impacts on firm performance: the case of the UAE. *International Journal of Entrepreneurial Behaviour & Research, 25*(1), 84-111. <https://doi.org/10.1108/IJEBR-08-2017-0299>
- Al Busaidi, N. S., Bhuiyan, A. B., & Zulkifli, N. (2019). The critical review on the adoption of ICTs in the small and medium enterprises (SMEs) in the developing countries.

*International Journal of Small and Medium Enterprises*, 2(2), 33-40.

<https://doi.org/10.46281/ijsmes.v2i2.437>

Al Maamari, N. K. S., & Bhuiyan, A. B. (2021). The empirical review of the organisational, technological, environmental and human resources factors on the efficiency of the digital transformation, Oman. *International Journal of Business and Management Future*, 5(1), 38-55. <https://doi.org/10.46281/ijbmf.v5i1.1458>

Alarabiat, A., & Ramos, I. (2019). The Delphi method in information systems research (2004-2017). *Electronic Journal of Business Research Methods*, 17(2), 86-99. <https://doi.org/10.34190/JBRM.17.2.04>

Alraja, M. N., Hussein, M. A., & Ahmed, H. M. S. (2021). What affects digitalisation process in developing economies? An evidence from SMEs sector in Oman. *Bulletin of Electrical Engineering and Informatics*, 10(1), 441-448. <https://doi.org/10.11591/eei.v10i1.2033>

Alt, R. (2018). Electronic Markets on digitalisation. *Electronic Markets*, 28(4), 397-402. <https://doi.org/10.1007/s12525-018-0320-7>

Ambrosini, V., & Altintas, G. (2019). Dynamic managerial capabilities. *Oxford Research Encyclopaedia of Business and Management*. (pp. 7-18). Oxford University Press. <https://doi.org/10.1093/acrefore/9780190224851.013.20>

Anderson, R. J., & Adams, W. A. (2019). *Scaling leadership: Building organisational capability and capacity to create outcomes that matter most*. (pp. 39 – 52). John Wiley & Sons.

Armitage, A. & Keeble-Allen, D. (2008), Undertaking a structured literature review or structuring a literature review: tales from the field, *The Electronic Journal of Business Research Methods*, 6(2), 103-114.

- Aunguroch, Y., Songnavong, C., Tantikosoom, P., Phanpaseuth, S., Sisoulath, A., Gunawan, J., ... & Khamlunvilaivong, D. (2020). Determining nursing research priorities in Lao people's democratic republic: A modified Delphi study. *Nursing and Midwifery Studies*, 9(3), 157-162. [https://doi.org/10.4103/nms.nms\\_87\\_19](https://doi.org/10.4103/nms.nms_87_19)
- Avgerou, C. (2001). The significance of context in information systems and organisational change. *Information Systems Journal*, 11(1), 43-63.
- Bai, C., Quayson, M., & Sarkis, J. (2021). COVID-19 pandemic digitisation lessons for sustainable development of micro-and small-enterprises. *Sustainable Production and Consumption*, 27, 1989-2001. <https://doi.org/10.1016/j.spc.2021.04.035>
- Baporikar, N., & Shikokola, S. (2020). Enhancing innovation adoption to boost SMEs' performance. *International Journal of Innovation in the Digital Economy (IJIDE)*, 11(1), 1-20. <https://doi.org/10.4018/IJIDE.2020010101>
- Barann, B., Hermann, A., Cordes, A. K., Chasin, F., & Becker, J. (2019). *Supporting Digital Transformation in Small and Medium-sized Enterprises: A Procedure Model Involving Publicly Funded Support Units*. [Paper Presentation] the 52nd Hawaii International Conference on System Sciences. <https://doi.org/10.24251/HICSS.2019.598>
- Barnard, C., Bakkers, J. H., Wünsche, S. (2017). *The road to the digital future of SMEs*. IDC White Paper, Virginia Media Business. <https://www.virginmediabusiness.co.uk/pdf/Insights%20Guides/The%20SMEs%20changing%20the%20world.pdf>
- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of Management*, 17(1), 99-120. <https://doi.org/10.1177/014920639101700108>
- Barrane, F. Z., Ndubisi, N. O., Kamble, S., Karuranga, G. E., & Poulin, D. (2020). Building trust in multi-stakeholder collaborations for new product development in the digital

- transformation era. *Benchmarking: An International Journal*, 28(1), 205-228.  
<https://doi.org/10.1108/BIJ-04-2020-0164>
- Barrett, M., Davidson, E., Prabhu, J., & Vargo, S. L. (2015). Service innovation in the digital age. *MIS Quarterly*, 39(1), 135-154. <https://doi.org/10.25300/MISQ/2015/39:1.03>
- Basias, N., & Pollalis, Y. (2018). Quantitative and qualitative research in business & technology: Justifying a suitable research methodology. *Review of Integrative Business and Economics Research*, 7, 91-105. <https://doi.org/10.25300/MISQ/2020/14418>
- Baskerville, R., Myers, M., and Yoo, Y. (2020). Digital first: The ontological reversal and new challenges for IS research. *MIS Quarterly*, 44(2), 509–523.  
<https://doi.org/10.1002/prs.11906>
- Baybutt, P. (2018). The validity of engineering judgment and expert opinion in hazard and risk analysis: The influence of cognitive biases. *Process safety progress*, 37(2), 205-210.
- Bazeley, P. (2009). Analysing qualitative data: More than ‘identifying themes. *Malaysian Journal of Qualitative Research*, 2(2), 6–22.
- Bedell-Pearce, J. (2018). Safe digital transformation for SMEs. *Network Security*, 2018(11), 6-7. [https://doi.org/10.1016/S1353-4858\(18\)30110-7](https://doi.org/10.1016/S1353-4858(18)30110-7)
- Berbel-Vera, J., Palanca, M. B., & Gonzalez-Sanchez, M. B. (2022). Key CDO functions for successful digital transformation: Insights from a Delphi study. *Technological Forecasting and Social Change*, 181, 121773.
- Berghaus, S., & Back, A. (2016). *Stages in Digital Business Transformation: Results of an Empirical Maturity Study* [Paper presentation]. 10<sup>th</sup> MCIS, Paphos (22).
- Berghaus, S., & Back, A. (2017). *Disentangling the fuzzy front end of digital transformation: Activities and approaches* [Paper presentation]. Association for Information Systems. CIS 2017 (4). <https://aisel.aisnet.org/icis2017/PracticeOriented/Presentations/4>

- Berman, S. J., & Bell, R. (2011). Digital transformation: Creating new business models where digital meets physical. *IBM Institute for Business Value*, 1–17. <https://s3-us-west-2.amazonaws.com/itworldcanada/archive/Themes/Hubs/Brainstorm/digital-transformation.pdf>
- Berman, S. J., Korsten, P. J. & Marshall, A. (2016). “Digital Reinvention in action-What to do and how to make it happen. *IBM Institute for Business Value*, 1-24. <https://www.ibm.com/downloads/cas/7MK5LPON>
- Bican, P. M. & Brem, A. (2020). Digital Business Model, Digital Transformation, Digital Entrepreneurship: Is There a Sustainable “Digital”? *Sustainability*, 12(13), 5239. <https://doi.org/10.3390/su12135239>
- Bleady, A., Ali, A. H., & Ibrahim, S. B. (2018). Dynamic capabilities theory: Pinning down a shifting concept. *Academy of Accounting and Financial Studies Journal*, 22(2), 1-16.
- Bloomberg, J. (2018). *Digitisation, digitalisation, and digital transformation: confuse them at your peril*. <https://www.forbes.com/sites/jasonbloomberg/2018/04/29/digitization-digitalization-and-digital-transformation-confusethem-at-your-peril/#2dd1ce842f2c>
- Boateng, R. (2022). *Data-Driven Enterprises – Evaluation of Winners and Losers*. Centre for the Study of the Economies of Africa (CSEA), The William and Flora Hewlett Foundation.
- Bockschecker, A., Hackstein, S., & Baumöl, U. (2018). *Systematisation of the term digital transformation and its phenomena from a socio-technical perspective–A literature review*. [Paper Presentation] 2018 European Conference of Information Systems (ECIS). Research Papers. 43. [https://aisel.aisnet.org/ecis2018\\_rp/43](https://aisel.aisnet.org/ecis2018_rp/43)
- Boneva, M. (2018). Challenges related to the digital transformation of business companies. In *Innovation Management, Entrepreneurship and Sustainability (IMES 2018)*, 101-114. Vysoká škola ekonomická v Praze.

- Bostrom, R. P., Gupta, S., & Thomas, D. (2009). A meta-theory for understanding information systems within sociotechnical systems. *Journal of Management Information Systems*, 26(1), 17-48. <https://doi.org/10.2753/MIS0742-1222260102>
- Bouwman, H., Nikou, S., & de Reuver, M. (2019). Digitalization, business models, and SMEs: How do business model innovation practices improve performance of digitalizing SMEs? *Telecommunications Policy*, 43(9), 101828. <https://doi.org/10.1016/j.telpol.2019.101828>
- Bowersox, D. J., Closs, D. J. & Drayer, R. W. (2005). The digital transformation: technology and beyond. *Supply Chain Management Review*, 9(1), 22-29.
- Brady, S. R. (2015). Utilising and adapting the Delphi method for use in qualitative research. *International Journal of Qualitative Methods*, 14(5). <https://doi.org/10.1177/1609406915621381>
- Brennen, J. S., & Kreiss, D. (2016). Digitalisation. *The international encyclopaedia of communication theory and philosophy*, 1-11.
- Brown, A., Fishenden, J., & Thompson, M. (2014). Organisational structures and digital transformation. *Digitising Government* (pp. 165-183). Palgrave Macmillan. [https://doi.org/10.1057/9781137443649\\_10](https://doi.org/10.1057/9781137443649_10)
- Bughin, J., LaBerge, L. & Mellbye, A. (2017). The case for digital reinvention. *McKinsey Quarterly*, 2, 1-15.
- Bumann, J., & Peter, M. K. (2019). Action fields of digital transformation—a review and comparative analysis of digital transformation maturity models and frameworks. *Digitalisierung und andere Innovationsformen im Management. Innovation und Unternehmertum*, 2, 13-40.
- Burch, T. K. (2003). Demography in a new key: a theory of population theory. *Demographic Research*, 9(11), 263-284. <https://doi.org/10.4054/DemRes.2003.9.11>

- Bygstad, Bendik, Munkvold, B. E., & Volkoff, O. (2015). Identifying generative mechanisms through affordances: a framework for critical realist data analysis. *Journal of Information Technology*, 13, 1–14. <https://doi.org/10.1057/jit.2015.13>
- Cannas, R. (2021). Exploring digital transformation and dynamic capabilities in agrifood SMEs. *Journal of Small Business Management*, 1-27. <https://doi.org/10.1080/00472778.2020.1844494>
- Cao, L., Mohan, K., Ramesh, B., & Sarkar, S. (2013). Adapting funding processes for agile IT projects: an empirical investigation. *European Journal of Information Systems*, 22(2), 191-205. <https://doi.org/10.1057/ejis.2012.9>
- Castagna, F., Centobelli, P., Cerchione, R., Esposito, E., Oropallo, E. & Passaro, R. (2020). Customer knowledge management in SMEs facing digital transformation. *Sustainability*, 12(9), 3899. <https://doi.org/10.3390/su12093899>
- Cecilia, F. (2020). E-leadership: The Implication of Digital transformation for Leadership in Organisations in Africa. <https://doi.org/10.31219/osf.io/sj6zf>
- Cech, F. & Tellioglu, H. (2019). Impact of the Digital Transformation: An Online Real-Time Delphi Study. *arXiv preprint arXiv:1904.11411*.
- Cha, K. J., Hwang, T., & Gregor, S. (2015). An integrative model of IT-enabled organizational transformation: A multiple case study. *Management Decision*, 53(8), 1755-1770.
- Châlons, C., & Dufft, N. (2017). The role of IT as an enabler of digital transformation. In *The drivers of digital transformation* (pp. 13-22). Springer, Cham. [https://doi.org/10.1007/978-3-319-31824-0\\_2](https://doi.org/10.1007/978-3-319-31824-0_2)
- Chandra, A., Paul, J. & Chavan, M. (2020). Internationalisation barriers of SMEs from developing countries: a review and research agenda. *International Journal of Entrepreneurial Behaviour & Research*. 26(6), 1281-1310. <https://doi.org/10.1108/IJEER-03-2020-0167>

- Chang, M., Gu, S., Huang, L., & Hsiao, T. Y. (2021). Constructing the Critical Success Factors in Digital Transformation for Taiwan's Travel Agencies. *Frontiers*, 2(11). [http://dx.doi.org/10.6981/FEM.202111\\_2\(11\).0032](http://dx.doi.org/10.6981/FEM.202111_2(11).0032)
- Chatterjee, S., Chaudhuri, R., Vrontis, D., & Basile, G. (2021). Digital transformation and entrepreneurship process in SMEs of India: a moderating role of adoption of AI-CRM capability and strategic planning. *Journal of Strategy and Management*. <https://doi.org/10.1108/JSMA-02-2021-0049>
- Chen, C. L., Lin, Y. C., Chen, W. H., Chao, C. F., & Pandia, H. (2021). Role of government to enhance digital transformation in small service business. *Sustainability*, 13(3), 1028.
- Chen, Y. Y. K., Jaw, Y. L., & Wu, B. L. (2016). Effect of digital transformation on organisational performance of SMEs: Evidence from the Taiwanese textile industry's web portal. *Internet Research*. 26(1) 186-212 <https://doi.org/10.1108/IntR-12-2013-0265>
- Ciriello, R. F., Richter, A. & Schwabe, G. (2018). Digital innovation. *Business & Information Systems Engineering*, 60(6), 563-569. <https://doi.org/10.1007/s12599-018-0559-8>
- Cohen, L., Manion, L., & Morrison, K. (2017). Validity and reliability. *In Research methods in education* (pp. 245-284). Routledge. <https://doi.org/10.4324/9781315456539-14>
- Cooper, V., & Molla, A. (2017). Information systems absorptive capacity for environmentally driven IS-enabled transformation. *Information Systems Journal*, 27(4), 379-425.
- Corrocher, N., & Ordanini, A., (2002). Measuring the digital divide: a framework for the analysis of cross-country differences. *Journal of Information Technology* 17(1), 9–19. <https://doi.org/10.1080/02683960210132061>
- Cortellazzo, L., Bruni, E. & Zampieri, R. (2019). The role of leadership in a digitalized world: a review. *Frontiers in Psychology*, 10, 1938. <https://doi.org/10.3389/fpsyg.2019.01938>

- Corver, Q. & Elkhuizen, G. (2014). *A framework for digital business transformation*. Cognizant Business Consulting Benelux. <https://www.cognizant.com/InsightsWhitepapers/aframework-for-digital-business-transformation-codex-1048.pdf>
- Crawford, L. M. (2020). *Conceptual and theoretical frameworks in research*. Foundations in research design. (pp. 4-14). Sage Publications.
- Creswell, J. W. (2014). *The selection of a research approach*. *Research design: Qualitative, quantitative, and mixed methods approach*, 3-24.
- Cruz, E. F., & da Cruz, A. M. R. (2020). Design Science Research for IS/IT Projects: Focus on Digital Transformation. In the *2020 15th Iberian Conference on Information Systems and Technologies (CISTI)* (pp. 1-6). IEEE. <https://doi.org/10.23919/CISTI49556.2020.9140972>
- Cuesta, C., Ruesta, M., Tuesta, D. & Urbiola, P. (2015). *The digital transformation of the banking industry*. BBVA Research. [https://www.bbva.com/wp-content/uploads/2015/08/EN\\_Observatorio\\_Banca\\_Digital\\_vf3.pdf](https://www.bbva.com/wp-content/uploads/2015/08/EN_Observatorio_Banca_Digital_vf3.pdf).
- Dalkey, N. & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. *Management Science*, 9(3), 458-467. <https://doi.org/10.1287/mnsc.9.3.458>
- Dang-Pham, D., Hoang, A. P., Vo, D. T., & Kautz, K. (2020) Digital Kaizen: *An approach for conducting large-scale digital transformation projects*. [Paper Presentation] Australasian Conference on Information Systems 2020, Wellington
- Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13 (3), 319–340. <https://doi.org/10.2307/249008>
- De la Boutetière, H., Montagner, A. & Reich, A. (2018). *Unlocking success in digital transformations*. McKinsey & Company.: <https://mck.co/2AzwomG>

- de Souza, E. M., & Forte, S. H. A. C. (2021). Exploring the Relationship Between Managerial Cognitive Capabilities and Dynamic Managerial Capabilities. *International Journal of Business Administration*, 12(5). <https://doi.org/10.5430/ijba.v12n5p1>
- Dehnert, M. (2020). Organisational Change Toward IT-Supported Personal Advisory in Incumbent Banks. In *International Conference on Business Informatics Research* (pp. 205-219). Springer, Cham. [https://doi.org/10.1007/978-3-030-61140-8\\_14](https://doi.org/10.1007/978-3-030-61140-8_14)
- Delbecq, A. L., Van de Ven, A. H. & Gustafson, D. H. (1975). *Group techniques for program planning: A guide to nominal group and Delphi processes* Scott: Foresman Glenview.
- Delgado, D. (2017). *Governance Model for Digital Transformation*. Instituto Superior Técnico, Universidade de Lisboa. <https://fenix.tecnico.ulisboa.pt/downloadFile/281870113703895/ExtendedAbstract77087>
- Delone, W. H. & McLean, E. R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research*, 3(1), 60-95. <https://doi.org/10.1080/07421222.2003.11045748>
- Delone, W. H. & McLean, E. R. (2003). The Delone and McLean model of information systems success: a ten-year update. *Journal of Management Information Systems*, 19(4), 9-30.
- Delone, W. H. & McLean, E. R. (2016). Information systems success measurement. *Foundations and Trends® in Information Systems*, 2(1), 1-116. <https://doi.org/10.1561/29000000005>
- DeSanctis, G. & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organisation Science*, 5(2), 121-147. <https://doi.org/10.1287/orsc.5.2.121>

- Dixon, S. E., Meyer, K. E. & Day, M. (2010). Stages of organisational transformation in transition economies: A dynamic capabilities approach. *Journal of Management Studies*, 47(3), 416-436. <https://doi.org/10.1111/j.1467-6486.2009.00856.x>
- Du, W. D., Pan, S. L., Leidner, D. E., & Ying, W. (2019). Affordances, experimentation and actualisation of FinTech: A blockchain implementation study. *The Journal of Strategic Information Systems*, 28(1), 50-65. <https://doi.org/10.1016/j.jsis.2018.10.002>
- Dyczkowska, J., & Dyczkowski, T. (2018). IT support to management control in small and medium-sized enterprises. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 515, 13-25. <https://doi.org/10.15611/pn.2018.515.01>
- Elia, G., Margherita, A., & Passiante, G. (2020). Digital entrepreneurship ecosystem: How digital technologies and collective intelligence are reshaping the entrepreneurial process. *Technological Forecasting and Social Change*, 150, 119791. <https://doi.org/10.1016/j.techfore.2019.119791>
- Eller, R., Alford, P., Kallmünzer, A., & Peters, M. (2020). Antecedents, consequences, and challenges of small and medium-sized enterprise digitalisation. *Journal of Business Research*, 112, 119-127. <https://doi.org/10.1016/j.jbusres.2020.03.004>
- European Commission. (2019). *Digital transformation*. [https://ec.europa.eu/growth/industry/policy/digitaltransformation\\_en](https://ec.europa.eu/growth/industry/policy/digitaltransformation_en)
- Eze, S. C., Chinedu-Eze, V. C., Bello, A. O., Inegbedion, H., Nwanji, T., & Asamu, F. (2019). Mobile marketing technology adoption in service SMEs: a multi-perspective framework. *Journal of science and technology policy management*, 10(3), 569-596. <https://doi.org/10.1108/JSTPM-11-2018-0105>
- Ezekoli, F. O., Onyia, C. I., & Bert-Okonkwo, C. B. N. (2019). State of readiness of the Nigerian construction industry towards digital transformation: The construction

- professionals' perception. *Journal of Engineering Research and Reports*, 1-11.  
<https://doi.org/10.9734/jerr/2019/v4i216896>
- Fachrunnisa, O., Adhiatma, A., Lukman, N., & Ab Majid, M. N. (2020). Towards SMEs' digital transformation: The role of agile leadership and strategic flexibility. *Journal of Small Business Strategy*, 30(3), 65-85.
- Ferreira, J., Coelho, A., & Moutinho, L. (2020). Dynamic capabilities, creativity and innovation capability and their impact on competitive advantage and firm performance: The moderating role of entrepreneurial orientation. *Technovation*, 92, 102061.  
<https://doi.org/10.1016/j.technovation.2018.11.004>
- Fitz, L., & Scheeg, J. (2021). *Propositions towards the Impact of Moral Values in Information System Design on Information System Success Depicted by the DeLone & McLean Information System Success Model* [Paper presentation]. 18th International Conference on e-Business, 1, 195-206. <https://doi.org/10.5220/0010626100002997>
- Fitzgerald, M., Kruschwitz, N., Bonnet, D., & Welch, M. (2014). Embracing digital technology: A new strategic imperative. *MIT Sloan management review*, 55(2), 1.
- Fletcher, A. J. & Marchildon, G. P. (2014). Using the Delphi method for qualitative, participatory action research in health leadership. *International Journal of Qualitative Methods*, 13(1), 1-18.
- Fletcher, A. J., & Marchildon, G. P. (2018). Reflection/Commentary on a Past Article: "Using the Delphi Method for Qualitative Research in Health Leadership." *International Journal of Qualitative Research*, 17, 1-3.  
<https://doi.org/10.1177/160940691401300101>
- Fonseca, P., & Picoto, W. N. (2020). The competencies needed for digital transformation. *Online Journal of Applied Knowledge Management (OJAKM)*, 8(2), 53-70.  
[https://doi.org/10.36965/OJAKM.2020.8\(2\)53-70](https://doi.org/10.36965/OJAKM.2020.8(2)53-70)

- Franco, M., Godinho, L., & Rodrigues, M. (2021). Exploring the influence of digital entrepreneurship on SME digitalisation and management. *Small Enterprise Research*, 1-24. <https://doi.org/10.1080/13215906.2021.1938651>
- Frenzel, A., Muench, J. C., Bruckner, M. T., & Veit, D. (2021). Digitisation or digitalisation? –Toward an understanding of definitions, use and application in IS research. *Proceeding of the 27th Americas Conference on Information Systems (AMCIS)*, Montreal.
- Fryer, T. (2022). A critical realist approach to thematic analysis: producing causal explanations. *Journal of Critical Realism*, 1-20.
- Galindo-Martín, M. Á., Castaño-Martínez, M. S., & Méndez-Picazo, M. T. (2019). Digital transformation, digital dividends, and entrepreneurship: A quantitative analysis. *Journal of Business Research*, 101, 522-527. <https://doi.org/10.1016/j.jbusres.2018.12.014>
- Garcia, A. H. (2018). The digital transformation playbook: Rethink your business for the digital age. *Economia Industrial*, 409, 149–151.
- Garzoni, A., De Turi, I., Secundo, G., & Del Vecchio, P. (2020). Fostering digital transformation of SMEs: a four levels approach. *Management Decision*, 58(8), 1543-1562. <https://doi.org/10.1108/MD-07-2019-0939>
- Giddens, A. (1984). *The constitution of society: Outline of the theory of structuration*. University of California Press.
- Gioia, D. (2021). A systematic methodology for doing qualitative research. *The Journal of Applied Behavioural Science*, (1), 20-29. <https://doi.org/10.1177/0021886320982715>
- Gioia, D. A., Corley, K. G. & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. *Organisational research methods*, 16(1), 15-31. <https://doi.org/10.1177/1094428112452151>

- Giovanis, A., Rizomyliotis, I., Konstantoulaki, K., & Magrizos, S. (2021). Mining the hidden seam of proximity m-payment adoption: A hybrid PLS-artificial neural network analytical approach. *European Management Journal*, 1-14. <https://doi.org/10.1016/j.emj.2021.09.007>
- Glaser, F. 2017. Pervasive decentralisation of digital infrastructures: A framework for blockchain-enabled system and use case analysis. *Proceedings of the Hawaii International Conference on System Sciences*, Waikoloa Beach, HI, (pp. 1543-1552). <https://doi.org/10.24251/HICSS.2017.186>
- Globalteckz (2020). *Timeframe for new ERP systems*. <https://www.globalteckz.com/typical-timeframe-for-new-erp-system/>
- Gobble, M. M. (2018). Digital strategy and digital transformation. *Research-Technology Management*, 61(5), 66-71. <https://doi.org/10.1080/08956308.2018.1495969>
- Goerzig, D. & Bauernhans, T. (2018). Enterprise architectures for the digital transformation in small and medium-sized enterprises. *Procedia CIRP*, 67, 540-545. <https://doi.org/10.1016/j.procir.2017.12.257>
- Gomes, S. B., Pinto, P., Santoro, F. M., & da Silva, M. M. (2020). Digital transformation and business process innovation: A car rental company case study. *Proceedings of the International Conference on Business Process Management* (pp. 246-262). Springer, Cham. [https://doi.org/10.1007/978-3-030-58638-6\\_15](https://doi.org/10.1007/978-3-030-58638-6_15)
- Gong, C., & Ribiere, V. (2021). Developing a unified definition of digital transformation. *Technovation*, 102, 102217. <https://doi.org/10.1016/j.technovation.2020.102217>
- Goodhue, D. L., & Thompson, R. L. (1995). Task-technology fit and individual performance. *MIS Quarterly*, 19(2), 213-236. <https://doi.org/10.2307/249689>
- Grandón, E. E., & Ramírez-Correa, P. (2018). Managers/owners' innovativeness and electronic commerce acceptance in Chilean SMEs: a multi-group analysis based on a structural

- equation model. *Journal of theoretical and applied electronic commerce research*, 13(3), 1-16. <https://doi.org/10.4067/S0718-18762018000300102>
- Grant, R. M. (1996). Prospering in dynamically competitive environments: Organisational capability as knowledge integration. *Organisation Science*, 7(4), 375-387. <https://doi.org/10.1287/orsc.7.4.375>
- Güngör, N., Özveren, C. G., & Selçuk, Y. E. K. E. (2020). The psychosocial antecedents of the accounting digital transformation of the companies: a model proposal in terms of the technology acceptance theory. *Hitit Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 13(1), 36-55. <https://doi.org/10.17218/hititsosbil.740045>
- Günther, W. A., Mehrizi, M. H. R., Huysman, M., and Feldberg, F. (2017). Debating big data: A literature review on realising value from big data. *The Journal of Strategic Information Systems* 26(3), 191-209. <https://doi.org/10.1016/j.jsis.2017.07.003>
- Guntur, G. (2019). A conceptual framework for qualitative research: A literature studies. *Capture: Jurnal Seni Media Rekam*, 10(2), 91-106. <https://doi.org/10.33153/capture.v10i2.2447>
- Gustomo, A., Herliana, S., Dhewanto, W., & Ghina, A. (2017). Building a conceptual framework of entrepreneurial competencies: The ontological, epistemological, and methodological view. *International Journal of Applied Business and Economic Research*, 15(10), 191-201.
- Ha, N. M., & Khoa, B. T. (2021). The Google Advertising Service Adoption Behaviour of Enterprise in the Digital Transformation Age. *Webology*, (Special Issue on Information Retrieval and Web Search), 18, 153-170. <https://doi.org/10.14704/WEB/V18SI02/WEB18064>
- Habibi, A., Sarafrazi, A. & Izadyar, S. (2014). Delphi technique theoretical framework in qualitative research. *The International Journal of Engineering and Science*, 3(4), 8-13.

- Haffke, I., Kalgovas, B. & Benlian, A. (2017). The Transformative Role of Bimodal IT in an Era of Digital Business. *Proceedings of the Hawaiian International Conference on System Sciences*. Hawaii. <https://doi.org/10.24251/HICSS.2017.660>
- Ham-Baloyi, W. T. and Jordan, P. (2016). “Systematic review as a research method in postgraduate nursing education,” *health sa gesondheid*, 21(1), 120-128. <https://doi.org/10.4102/hsag.v21i0.942>
- Handoko, H. S., Rastini, E. K. & Wijayaningtyas, M. (2019). The role of transferors in improving SMEs’ technology capability in developing countries. *Proceedings of the 2019 International Conference on Organisational Innovation (ICOI 19)*. Atlantis Press. <https://doi.org/10.2991/icoi-19.2019.89>
- Hanelt, A., Bohnsack, R., Marz, D., & Antunes Marante, C. (2021). A systematic review of the literature on digital transformation: Insights and implications for strategy and organisational change. *Journal of Management Studies*, 58(5), 1159-1197. <https://doi.org/10.1111/joms.12639>
- Hanelt, A., Nastjuk, I., Krüp, H., Eisel, M., Ebermann, C., Brauer, B., Piccinini, E., Hildebrandt, B., and Kolbe, L. M. (2015). Disruption on the way? The role of mobile applications for electric vehicle diffusion, *Proceedings of the Wirtschaftsinformatik Conference*, Osnabruck, Germany, (pp. 1023-1037).
- Hansen, A. K., Stoettrup S., Larsen, M., & Lassen, A. H. (2021). The role of absorptive capacity and employee empowerment in digital transformation of SMEs. *Proceedings of the Conference on Learning Factories (CLF) 2021*. <https://doi.org/10.2139/ssrn.3859277>
- Hansen, A. M., Kraemmergaard, P., & Mathiassen, L. (2011). Rapid adaptation in digital transformation: A participatory process for engaging IS and business leaders. *MIS Quarterly Executive*, 10(4).

- Hartl, E. & Hess, T. (2017). *The role of cultural values for digital transformation: Insights from a Delphi study*. [Paper Presentation] 2017 American Conference on Information Systems (AMCIS2017) Boston, MA.
- Hasson, F., Keeney, S., & McKenna, H. (2000). Research guidelines for the Delphi survey technique. *Journal of advanced nursing*, 32(4), 1008-1015. <https://doi.org/10.1046/j.1365-2648.2000.t01-1-01567.x>
- Hausberg, J., Liere-Netheler, K., Packmohr, S., Pakura, S. & Vogelsang, K. (2018). *Digital transformation in business research: a systematic literature review and analysis*. DRUID18. Copenhagen Business School, Copenhagen, Denmark. <https://ssrn.com/abstract=3169203>
- Hayashi, Jr, P., Abib, G., & Hoppen, N. (2019). Validity in qualitative research: A processual approach. *The Qualitative Report*, 24(1), 98-112. <https://doi.org/10.46743/2160-3715/2019.3443>
- Heath, J., Williamson, H., Williams, L., & Harcourt, D. (2018). “It is just more personal”: Using multiple methods of qualitative data collection to facilitate participation in research focusing on sensitive subjects. *Applied Nursing Research*, 43, 30-35. <https://doi.org/10.1016/j.apnr.2018.06.015>
- Heavin, C., & Power, D. J. (2018). Challenges for digital transformation—towards a conceptual decision support guide for managers. *Journal of Decision Systems*, 27(sup1), 38-45. <https://doi.org/10.1080/12460125.2018.1468697>
- Heider, A., Gerken, M., van Dinther, N., & Hülsbeck, M. (2020). Business model innovation through dynamic capabilities in small and medium enterprises—Evidence from the German Mittelstand. *Journal of Business Research*, 130, 635-645. <https://doi.org/10.1016/j.jbusres.2020.04.051>

- Helbing, D. (2019). *Societal, economic, ethical, and legal challenges of the digital revolution: from big data to deep learning, artificial intelligence, and manipulative technologies. Towards Digital Enlightenment* (pp. 47-72). Springer, Cham. [https://doi.org/10.1007/978-3-319-90869-4\\_6](https://doi.org/10.1007/978-3-319-90869-4_6)
- Helfat, C. E. & Martin, J. A. (2015). Dynamic managerial capabilities: Review and assessment of managerial impact on strategic change. *Journal of Management*, 41(5), 1281-1312. <https://doi.org/10.1177/0149206314561301>
- Helfat, C. E. & Peteraf, M. A. (2015). Managerial cognitive capabilities and the micro-foundations of dynamic capabilities. *Strategic Management Journal*, 36(6), 831-850. <https://doi.org/10.1002/smj.2247>
- Helfat, C. E., & Winter, S. G. (2011). Untangling dynamic and operational capabilities: Strategy for the (N) ever-changing world. *Strategic management journal*, 32(11), 1243-1250. <https://doi.org/10.1002/smj.955>
- Hemerling, J., Kilmann, J., Danoesastro, M., Stutts, L., & Ahern, C. (2018). It is not a digital transformation without a digital culture. *Boston Consulting Group*, 1-11.
- Hewavitharana, T., Nanayakkara, S., Perera, A., & Perera, P. (2021, December). Modifying the Unified Theory of Acceptance and Use of Technology (UTAUT) Model for the Digital Transformation of the Construction Industry from the User Perspective. *Informatics*, 8(4), 81. <https://doi.org/10.3390/informatics8040081>
- Hönigsberg, S., & Dinter, B. (2019). *Toward a Method to Foster the Digital Transformation in SME Networks* [Paper presentation]. Conference: International Conference on Information Systems (ICIS) 2019. Munich.
- Hrustek, L., Furjan, M. T. & Pihir, I. (2019). Influence of Digital Transformation Drivers on Business Model creation. *Proceedings of the 42nd International Convention on Information and Communication Technology, Electronics, and Microelectronics*

(MIPRO 2019) (pp. 1304-1308). IEEE.

<https://doi.org/10.23919/MIPRO.2019.8756666>

Humphrey-Murto, S., & de Wit, M. (2019). The Delphi method—more research, please. *Journal of clinical epidemiology*, *106*, 136-139.

<https://doi.org/10.1016/j.jclinepi.2018.10.011>

Hund, A., Wagner, H. T., Beimborn, D., & Weitzel, T. (2021). Digital innovation: Review and novel perspective. *The Journal of Strategic Information Systems*, *30*(4), 101695.

<https://doi.org/10.1016/j.jsis.2021.101695>

Huy, Q., & Zott, C. (2019). Exploring the affective underpinnings of dynamic managerial capabilities: How managers' emotion regulation behaviours mobilise resources for their firms. *Strategic Management Journal*, *40*(1), 28-54. <https://doi.org/10.1002/smj.2971>

Ignatiadis, I., & Nandhakumar, J. (2007). The impact of enterprise systems on organisational control and drift: A human-machine agency perspective. *International Journal of Enterprise Information Systems (IJEIS)*, *3*(3), 36-51.

Indriastuti, M., & Fuad, K. (2020). Impact of covid-19 on digital transformation and sustainability in small and medium enterprises (SMEs): A conceptual framework. *Proceedings of the Conference on Complex, Intelligent, and Software Intensive Systems* (pp. 471-476). Springer, Cham. [https://doi.org/10.1007/978-3-030-50454-0\\_48](https://doi.org/10.1007/978-3-030-50454-0_48)

Iphofen, R., & Tolich, M. (2018). Qualitative Research Ethics with Vulnerable Groups. *The SAGE Handbook of Qualitative Research Ethics*, *301*, 301-427. <https://doi.org/10.4135/9781526435446>

Isaksson, V. & Hylving, L. (2017). *The Effect of Anarchistic Actions in Digital Product Innovation Networks: The Case of “Over the Air” Software Updates*. [Paper Presentation] the Hawaii International Conference on System Sciences 2017 (HICSS-50). <https://doi.org/10.24251/HICSS.2017.695>

- Ismail, M. H., Khater, M., & Zaki, M. (2017). Digital business transformation and strategy: What do we know so far? *Cambridge Service Alliance*, 10(1), 1-35.
- Issa, A., Hatiboglu, B., Bildstein, A. & Bauernhansl, T. (2018). Industrie 4.0 roadmap: Framework for digital transformation based on the concepts of capability maturity and alignment. *Procedia CIRP*, 72, 973-978. <https://doi.org/10.1016/j.procir.2018.03.151>
- Ivančić, L., Vukšić, V. B. & Spremić, M. (2019). Mastering the digital transformation process: business practices and lessons learned. *Technology Innovation Management Review*, 9(2), 36-50. <https://doi.org/10.22215/timreview/1217>
- Jabareen, Y. (2009), Building a conceptual framework: philosophy, definitions, and procedure. *International Journal of Qualitative Methods*, 8(4), 49-62. <https://doi.org/10.1177/160940690900800406>
- Jöhnk, J., Oesterle, S., Ollig, P. & Riedel, L. N. (2020). *The Complexity of Digital Transformation—Conceptualising Multiple Concurrent Initiatives*. [Paper Presentation] 15th International Conference on Wirtschaftsinformatik (WI), Potsdam: Germany. [https://doi.org/10.30844/wi\\_2020\\_j8-joehnk](https://doi.org/10.30844/wi_2020_j8-joehnk)
- Jones, M. R., & Karsten, H. (2008). Giddens's Structuration Theory and Information Systems Research. *MIS Quarterly*, 32(1), 127–157. <https://doi.org/10.2307/25148831>
- Joseph, G. (2006). Understanding developments in the management information value chain from a structuration theory framework. *International Journal of Accounting Information Systems*, 7(4), 319-341.
- Kaiser, K. (2009). Protecting respondent confidentiality in qualitative research. *Qualitative Health Research*, 19(11), 1632–1641. <https://doi.org/10.1177/1049732309350879>.
- Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D. & Buckley, N. (2017). *Achieving Digital Maturity*. MIT Sloan Management Review and Deloitte University Press. (pp. 1-30). <https://sloanreview.mit.edu/projects/achieving-digital-maturity/>

- Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D. & Buckley, N. (2015). *Strategy, not technology, drives digital transformation*. MIT Sloan Management Review and Deloitte University Press, 14(1-25).
- Katz, Y. (2019). Technology, Society, and the Digital Gap. *Advances in Applied Sociology*, 9(01), 60.
- Kelley-Quon, L. I. (2018). Surveys: Merging qualitative and quantitative research methods. *Seminars in paediatric surgery* 27(6), 361-366. WB Saunders. <https://doi.org/10.1053/j.sempedsurg.2018.10.007>
- Kerlinger, F. N. & Lee, H. B. (2000). *Foundations of behavioural research*. (p. 11) Cengage Learning
- Khairuddin, S. M. H. S., & Olowosuyi, O. S. (2020). Digital Adoption of SME in Nigeria: The Relationship with Business Performance. *Journal of Management and Muamalah*, 10(2), 21-34.
- Khalidi, K. (2017). Quantitative, Qualitative, or Mixed Research: Which Research Paradigm to Use? *Journal of Educational and Social Research*, 7(2), 15-24. <https://doi.org/10.5901/jesr.2017.v7n2p15>
- Khayer, A., Talukder, M. S., Bao, Y., & Hossain, M. N. (2020). Cloud computing adoption and its impact on SMEs' performance for cloud supported operations: A dual-stage analytical approach. *Technology in Society*, 60, 101225. <https://doi.org/10.1016/j.techsoc.2019.101225>
- Khin, S., & Ho, T. C. (2019). Digital technology, digital capability, and organisational performance. *International Journal of Innovation Science*. 11 (2), 177-195. <https://doi.org/10.1108/IJIS-08-2018-0083>

- Kivunja, C. (2018). Distinguishing between theory, theoretical framework, and conceptual framework: A systematic review of lessons from the field. *International Journal of Higher Education*, 7(6), 44-53. <https://doi.org/10.5430/ijhe.v7n6p44>
- Ko, E. J., Kim, A. H., & Kim, S. S. (2021). Toward the understanding of the appropriation of ICT-based Smart-work and its impact on performance in organisations. *Technological Forecasting and Social Change*, 171, 120994. <https://doi.org/10.1016/j.techfore.2021.120994>
- Koelsch, L. E. (2013). Reconceptualising the member check interview. *International Journal of Qualitative Methods*, 12(1), 168-179. <https://doi.org/10.1177/160940691301200105>
- Koelsch, L. E. (2018). Reflection/Commentary on a Past Article: Reconceptualising the Member Check Interview *International Journal of Qualitative Methods*, 17(1), <https://doi.org/10.1177/1609406918788196>
- Kumar, A., & Ayedee, D. (2021). Technology Adoption: A Solution for SMEs to Overcome Problems during COVID-19. *Forthcoming, Academy of Marketing Studies Journal*, 25(1). 1-16.
- Kumar, P. & Kaur, M. H. (2019). Barriers to E-Commerce Adoption: A Stage Oriented Model for SMEs in Developing Nations. *Our Heritage*, 67(10), 328-344.
- Kumar, R. (2019). *Research methodology: A step-by-step guide for beginners*. Sage Publications Limited.
- Kumbure, M. M., Tarkiainen, A., Luukka, P., Stoklasa, J., & Jantunen, A. (2020). Relation between managerial cognition and industrial performance: An assessment with strategic cognitive maps using fuzzy-set qualitative comparative analysis. *Journal of Business Research*, 114, 160-172.
- Kushner, K. (2010). A Universal Definition of Small Enterprise: A Procrustean bed for SMEs? World Bank Blogs: Private Sector Development Blog.

<https://blogs.worldbank.org/psd/a-universal-definition-of-small-enterprise-a-procrustean-bed-for-smes>

Kutzner, K., Schoormann, T. & Knackstedt, R. (2018). *Digital transformation in information systems research: a taxonomy-based approach to structure the field*. [Paper Presentation] the twenty-sixth European Conference on Information Systems (ECIS2018), Portsmouth, UK.

Lammers, T., Tomidei, L., & Trianni, A. (2019, August). *Towards a novel framework of barriers and drivers for digital transformation in industrial supply chains*. [Paper Presentation] 2019 Portland International Conference on Management of Engineering and Technology (PICMET) 1-6. IEEE.

<https://doi.org/10.23919/PICMET.2019.8893875>

Lang, M., Wiesche, M., & Krcmar, H. (2018). Criteria for selecting cloud service providers: a Delphi study of quality-of-service attributes. *Information & Management*, 55(6), 746-758. <https://doi.org/10.1016/j.im.2018.03.004>

Legner, C., Eymann, T., Hess, T., Matt, C., Böhmman, T., Drews, P., ... & Ahlemann, F. (2017). Digitalisation: opportunity and challenge for the business and information systems engineering community. *Business & information systems engineering*, 59(4), 301-308.

<https://doi.org/10.1007/s12599-017-0484-2>

Levy, Y. & Ellis, T. J. (2006). "A Systems Approach to Conduct an Effective Literature Review in Support of Information Systems Research," *Informing Science Journal*, 9,181-212.

<https://doi.org/10.28945/479>

Li, F. (2020). The digital transformation of business models in the creative industries: A holistic framework and emerging trends. *Technovation*, 92, 102012.

<https://doi.org/10.1016/j.technovation.2017.12.004>

- Li, L., Su, F., Zhang, W. & Mao, J. Y. (2018). Digital transformation by SME entrepreneurs: A capability perspective. *Information Systems Journal*, 28(6), 1129-1157. <https://doi.org/10.1111/isj.12153>
- Liere-Netheler, K., Packmohr, S. & Vogelsang, K. (2018). Drivers of Digital Transformation in Manufacturing. *The Digital Supply Chain of the Future: Technologies, Applications, and Business Models*. [Paper Presentation] the 51st Hawaii International Conference on System Sciences (HICSS 2018). (pp. 3926-3935). <https://doi.org/10.24251/HICSS.2018.493>
- Lim, S., Saldanha, T., Malladi, S., & Melville, N. P. (2009) Theories Used in Information Systems Research: Identifying Theory Networks in Leading IS Journals. [Paper Presentation] International Conference of Information Systems (ICIS 2009) 91. <http://aisel.aisnet.org/icis2009/91>
- Lukonga, I. (2020). *Harnessing Digital Technologies to Promote SMEs and Inclusive Growth in the MENAP Region*. IMF Working Paper, WP/20/135. <https://doi.org/10.5089/9781513550770.001>
- Lutfi, A., Alsyouf, A., Almaiah, M. A., Alrawad, M., Abdo, A. A. K., Al-Khasawneh, A. L., ... & Saad, M. (2022). Factors Influencing the Adoption of Big Data Analytics in the Digital Transformation Era: Case Study of Jordanian SMEs. *Sustainability*, 14(3), 1802. <https://doi.org/10.3390/su14031802>
- Lyytinen, K., & Rose, G. M. (2003). The disruptive nature of information technology innovations: the case of internet computing in systems development organisations. *MIS Quarterly*, 27(4), 557-596. <https://doi.org/10.2307/30036549>
- Mahmood, F., Khan, A. Z., & Khan, M. B. (2019). Digital organisational transformation issues, challenges, and impact: A systematic literature review of a decade. *Abasyn University Journal of Social Sciences*, 12(2). <https://doi.org/10.34091/AJSS.12.2.03>

- Mahraz, M. I., Benabbou, L., & Berrado, A. (2019, July). A systematic literature review of digital transformation. *Proceedings of the International Conference on Industrial Engineering and Operations Management Toronto* (pp. 23-25).
- Majdalawieh, M., & Khan, S. (2022). Building an Integrated Digital Transformation System Framework: A Design Science Research, the Case of FedUni. *Sustainability*, 14(10), 6121.
- Markus, M. L., & Benjamin, R. I. (1997). The magic bullet theory in IT-enabled transformation. *MIT Sloan Management Review*.
- Markus, M. L., & Nan, V. W. (2020). Theorizing the connections between digital innovations and societal transformation: Learning from the case of M-Pesa in Kenya. In S. Nambisan, K. Lyytinen, & Y. Yoo (Eds.), *Handbook of Digital Innovation* (pp. 64-82). Elgaronline. <https://doi.org/10.4337/9781788119986.00013>
- Martin, J. A., & Bachrach, D. G. (2018). A relational perspective of the micro-foundations of dynamic managerial capabilities and transactive memory systems. *Industrial Marketing Management*, 74, 27-38. <https://doi.org/10.1016/j.indmarman.2018.07.008>
- Matarazzo, M., Penco, L., Profumo, G., & Quaglia, R. (2021). Digital transformation and customer value creation in Made in Italy SMEs: A dynamic capabilities perspective. *Journal of Business Research*, 123, 642-656. <https://doi.org/10.1016/j.jbusres.2020.10.033>
- Matt, C., Hess, T. & Benlian, A. (2015). Digital transformation strategies. *Business & Information Systems Engineering*, 57(5), 339-343. <https://doi.org/10.1007/s12599-015-0401-5>
- Maxwell, J. A. (2021). Why qualitative methods are necessary for generalisation. *Qualitative Psychology*, 8(1), 111. <https://doi.org/10.1037/qup0000173>

- McDonald, N., Schoenebeck, S., & Forte, A. (2019). Reliability and inter-rater reliability in qualitative research: Norms and guidelines for CSCW and HCI practice. *Proceedings of the ACM on human-computer interaction*, 3(CSCW), 1-23. <https://doi.org/10.1145/3359174>
- McPherson, S., Reese, C., & Wendler, M. C. (2018). Methodology update: Delphi studies. *Nursing Research*, 67(5), 404-410. <https://doi.org/10.1097/NNR.0000000000000297>
- Mergel, I., Edelmann, N. & Haug, N. (2019). Defining digital transformation: Results from expert interviews. *Government Information Quarterly*, 36(4), 101385. <https://doi.org/10.1016/j.giq.2019.06.002>
- Merriam, S. B. (2002). Introduction to qualitative research. *Qualitative research in practice: Examples for discussion and analysis*, 1(1), 1-17.
- Mićić, L. (2017). Digital transformation and its influence on GDP. *ECONOMICS - Innovative and Economic Research*, 5(2), 135-147. <https://doi.org/10.1515/eoik-2017-0028>
- Mihailescu, M., & Mihailescu, D. (2018). The emergence of digitalisation in the context of health care. *Proceedings of the 51st Hawaii International Conference on System Sciences*, 3066-3071. Hawaii. <https://doi.org/10.24251/HICSS.2018.387>
- Miles, M. & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (pp. 221-265). Thousand Oaks, CA: Sage.
- Miller, R. M., Chan, C. D., & Farmer, L. B. (2018). Interpretative phenomenological analysis: A contemporary qualitative approach. *Counsellor Education and Supervision*, 57(4), 240-254. <https://doi.org/10.1002/ceas.12114>
- Mohamad, M. M., Sulaiman, N. L., Sern, L. C., & Salleh, K. M. (2015). Measuring the validity and reliability of research instruments. *Procedia-Social and Behavioural Sciences*, 204, 164-171. <https://doi.org/10.1016/j.sbspro.2015.08.129>

- Morakanyane, R., Grace, A. A., & O'reilly, P. (2017). Conceptualizing digital transformation in business organizations: A Systematic Review of Literature. *Bled eConference*, 21, 428-444. <https://doi.org/10.18690/978-961-286-043-1.30>
- Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification strategies for establishing reliability and validity in qualitative research. *International journal of qualitative methods*, 1(2), 13-22. <https://doi.org/10.1177/160940690200100202>
- Moser, A., & Korstjens, I. (2018). Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis. *European Journal of General Practice*, 24(1), 9-18. <https://doi.org/10.1080/13814788.2017.1375091>
- Muditomo, A., & Wahyudi, I. (2021). Conceptual model for SME digital transformation during the covid-19 pandemic time in Indonesia: r-digital transformation model. *Baskara: Journal of Business and Entrepreneurship*, 3(1), 13-23. <https://doi.org/10.24853/baskara.3.1.13-24>
- Myovella, G., Karacuka, M. & Haucap, J. (2020). Digitalisation and economic growth: A comparative analysis of Sub-Saharan Africa and OECD economies. *Telecommunications Policy*, 44(2), 101856. <https://doi.org/10.1016/j.telpol.2019.101856>
- Nadeem, A., Abedin, B., Cerpa, N. & Chew, E. (2018). Digital transformation & digital business strategy in electronic commerce-the role of organisational capabilities. *Journal of Theoretical and Applied Electronic Commerce Research*, 13(2), i-viii. <https://doi.org/10.4067/S0718-18762018000200101>
- Nadkarni, S., & Prügl, R. (2021). Digital transformation: a review, synthesis and opportunities for future research. *Management Review Quarterly*, 71(2), 233-341.

- Nambisan, S. (2017). Digital entrepreneurship: Toward a digital technology perspective of entrepreneurship. *Entrepreneurship Theory and Practice*, 41(6), 1029-1055. <https://doi.org/10.1111/etap.12254>
- Nambisan, S., Lyytinen, K., Majchrzak, A. & Song, M. (2017). Digital Innovation Management: Reinventing innovation management research in a digital world. *MIS Quarterly*, 41(1). <https://doi.org/10.25300/MISQ/2017/41:1.03>
- Nambisan, S., Wright, M. & Feldman, M. (2019). The digital transformation of innovation and entrepreneurship: Progress, challenges, and key themes. *Research Policy*, 48(8), 103773. <https://doi.org/10.1016/j.respol.2019.03.018>
- Ndiaye, N., Razak, L. A., Nagayev, R., & Ng, A. (2018). Demystifying small and medium enterprises (SMEs) performance in emerging and developing economies. *Borsa Istanbul Review*, 18(4), 269-281. <https://doi.org/10.1016/j.bir.2018.04.003>
- Negahban, A. & Chung, C. H. (2014). Discovering determinants of users' perception of mobile device functionality fit. *Computers in Human Behaviour*, 35, 75-84. <https://doi.org/10.1016/j.chb.2014.02.020>
- Nielsen, L. (2011). *Classifications of Countries Based on Their Level of Development: How It Is Done and How It Could Be Done*. International Monetary Fund Working Paper, WP/11/31. <https://www.imf.org/external/pubs/ft/wp/2011/wp1131.pdf>
- Norman, D. A. (1999). Affordance, conventions, and design. *Interact*, 6, 38-42. <https://doi.org/10.1145/301153.301168>
- North, K., Aramburu, N., & Lorenzo, O. J. (2019). Promoting digitally-enabled growth in SMEs: a framework proposal. *Journal of Enterprise Information Management*. 33(1) 231-262. <https://doi.org/10.1108/JEIM-04-2019-0103>
- Nurqamarani, A. S., Sogiarto, E., & Nurlaeli, N. (2021). Technology Adoption in Small-Medium Enterprises based on Technology Acceptance Model: A Critical Review.

*Journal of Information Systems Engineering and Business Intelligence*, 7(2), 162-172.

<https://doi.org/10.20473/jisebi.7.2.162-172>

Nwaiwu, F. (2018). Review and comparison of conceptual frameworks on digital business transformation. *Journal of Competitiveness*, 10(3), 86-100.

<https://doi.org/10.7441/joc.2018.03.06>

Nwankpa, J. K., & Roumani, Y. (2016). IT Capability and Digital Transformation: A Firm Performance Perspective. *Proceedings of ICIS 2016* (pp. 1–16).

Nyerges, T., Jankowski, P., Tuthill, D., & Ramsey, K. (2006). Collaborative water resource decision support: Results of a field experiment. *Annals of the Association of American Geographers*, 96(4), 699-725.

Nylén, D., & Holmström, J. (2015). Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation. *Business Horizons*, 58(1), 57-67.

Ochs, T. & Riemann, U. A. (2018). IT strategy follows digitalisation. In *Encyclopaedia of Information Science and Technology*, (4<sup>th</sup> Ed) (pp. 873-887) IGI Global.

<https://doi.org/10.4018/978-1-5225-2255-3.ch075>

Ocloo, C. E., Xuhua, H., Akaba, S., Shi, J., & Worwui-Brown, D. K. (2020). The determinant factors of business-to-business (B2B) E-commerce adoption in small-and medium-sized manufacturing enterprises. *Journal of global information technology management*, 23(3), 191-216.

OECD (2019), *OECD SME and Entrepreneurship Outlook 2019*, OECD Publishing,

<https://doi.org/10.1787/34907e9c-en>

OECD (2021), *OECD Data: Gross National Income*, OECD Publishing,

<https://data.oecd.org/natincome/gross-national-income.htm>

- Ogbuokiri, B. O., Udanor, C. N., & Agu, M. N. (2015). Implementing big data analytics for small and medium enterprise (SME) regional growth. *IOSR Journal of Computer Engineering*, 17(6), 35-43.
- Orlikowski, W. J. (2000). Using technology and constituting structures: A practice lens for studying technology in organisations. *Organisation Science*, 11(4), 404-428.
- Osmundsen, K., Iden, J. & Bygstad, B. (2018). Digital Transformation: Drivers, Success Factors, and Influence. [Paper Presentation] the 12<sup>th</sup> Mediterranean Conference on Information Systems (MCIS), 37.
- Paavola, R., Hallikainen, P. & Elbanna, A. (2017). Role of Middle Managers in Modular Digital Transformation: The Case of Servu. *Proceedings of the 25th European Conference on Information Systems (ECIS)*, Guimarães, Portugal, 2017 (pp. 887-903). ISBN 978-989-20-7655-3 Research Papers. [http://aisel.aisnet.org/ecis2017\\_rp/58](http://aisel.aisnet.org/ecis2017_rp/58)
- Pari, F., Lubis, D. P., & Bintari, R. (2020). Adaptive Structuration Analysis in Innovation Communication of Indonesian National Standard in Micro, Small and Medium Enterprises. *Jurnal Penyuluhan*, 16(2), 250-266. <https://doi.org/10.25015/16202031462>
- Parida, V., Sjödin, D. & Reim, W. (2019). Reviewing literature on digitalisation, business model innovation, and sustainable industry: Past achievements and future promises. *Sustainability*. 11(2), 391. <https://doi.org/10.3390/su11020391>
- Parker, K. (2018). *Ability, Capability, Capacity and Competence (and Reality)*, The Knowledge Economy, <http://theknowledgeeconomy.blog/2018/10/02/ability-capability-capacity-and-competence-and-reality/>
- Pesonen, J. (2020). Management and leadership for digital transformation in tourism. *Handbook of e-Tourism*, (pp. 1-34). Springer

- Petrikina, J., Krieger, M., Schirmer, I., Stoeckler, N., Saxe, S., & Baldauf, U. (2017). *Improving the readiness for change – Addressing information concerns of internal stakeholders in the smartPORT Hamburg* [Paper presentation]. Americas Conference on Information Systems. Boston: USA.
- Piccinini, E., Hanelt, A., Gregory, R., & Kolbe, L. (2015). Transforming industrial business: the impact of digital transformation on automotive organisations. *Proceedings of the ICIS 2015*. <https://aisel.aisnet.org/icis2015/proceedings/GeneralIS/5>
- Pihir, I., Tomičić-Pupek, K., & Furjan, M. T. (2018). Digital transformation insights and trends. *Proceedings of Central European Conference on Information and Intelligent Systems*, (pp. 141-149). Faculty of Organisation and Informatics Varazdin.
- Pihir, I., Tomičić-Pupek, K., & Tomičić Furjan, M. (2019). Digital transformation playground- literature review and framework of concepts. *Journal of Information and Organisational Sciences*, 43(1), 33-48. <https://doi.org/10.31341/jios.43.1.3>
- Pittaway, L., & Cope, J. (2007). Entrepreneurship education: A systematic review of the evidence. *International Small Business Journal*, 25(5), 479-510.
- Pousttchi, K., Gleiss, A., Buzzi, B., & Kohlhagen, M. (2019). Technology Impact types for digital transformation. *2019 IEEE 21st Conference on Business Informatics (CBI) 1*, (pp. 487-494). IEEE. <https://doi.org/10.1109/CBI.2019.00063>
- Prange, C., & Zhao, Y. (2018). Strategies for Internationalisation: How Chinese SMEs deal with distance and market entry speed. In D. Noémie & M. Ulrike (Eds.), *Key success factors of SME internationalisation: A cross-country perspective* (Vol. 34, pp. 205–224). Emerald Publishing Limited. <https://doi.org/10.1108/S1876-066X20180000034012>
- Priyono, A., Moin, A., & Putri, V. N. A. O. (2020). Identifying Digital Transformation Paths in the Business Model of SMEs during the COVID-19 Pandemic. *Journal of Open*

*Innovation: Technology, Market, and Complexity*, 6(4), 104.

<https://doi.org/10.3390/joitmc6040104>

Rassool, M. R. & Dissanayake, D. M. R. (2019). Digital Transformation for Small & Medium Enterprises (SMEs): with Special Focus on Sri Lankan Context as an Emerging Economy. *International Journal of Business and Management Review*. 7(4), 59-76

Ravitch, S. M. & Riggan, M. (2017). *How conceptual frameworks guide research* (2nd Ed). Los Angeles, CA: Sage.

Reddy, S. K. & Reinartz, W. (2017). Digital transformation and value creation: Sea change ahead. *GfK Marketing Intelligence Review*, 9(1), 10-17. <https://doi.org/10.1515/gfkmir-2017-0002>

Reinartz, W., Wiegand, N., & Imschloss, M. (2019). The impact of digital transformation on the retailing value chain. *International Journal of Research in Marketing*, 36(3), 350-366. <https://doi.org/10.1016/j.ijresmar.2018.12.002>

Reis, J., Amorim, M., Melão, N. & Matos, P. (2018). Digital transformation: a literature review and guidelines for future research. *Proceedings of World Conference on Information Systems and Technologies* (pp. 411-421). Springer, Cham. [https://doi.org/10.1007/978-3-319-77703-0\\_41](https://doi.org/10.1007/978-3-319-77703-0_41)

Riera, C., & Iijima, J. (2019). The role of IT and organisational capabilities on digital business value. *Pacific Asia Journal of the Association for Information Systems*, 11(2), 4. <https://doi.org/10.17705/1pais.11204>

Ritter, T. & Pedersen, C. L. (2020). Digitisation capability and the digitalisation of business models in business-to-business firms: Past, present, and future. *Industrial Marketing Management*, 86, 180-190. <https://doi.org/10.1016/j.indmarman.2019.11.019>

Rose, J., & Johnson, C. W. (2020). Contextualising reliability and validity in qualitative research: toward more rigorous and trustworthy qualitative social science in leisure

research. *Journal of Leisure Research*, 51(4), 432-451.

<https://doi.org/10.1080/00222216.2020.1722042>

Rossato, C., & Castellani, P. (2020). The contribution of digitalisation to business longevity from a competitiveness perspective. *The TQM Journal*, 32 (4), 617-645.

<https://doi.org/10.1108/TQM-02-2020-0032>

Roztock, N., & Weistroffer, H. R. (2009). Research trends in information and communications technology in developing, emerging and transition economies. *Collegium of Economic Analysis*, 20, 113-127.

Saarikko, T., Westergren, U. H., & Blomquist, T. (2020). Digital transformation: Five recommendations for the digitally conscious firm. *Business Horizons*, 63(6), 825-839.

<https://doi.org/10.1016/j.bushor.2020.07.005>

Sahu, N., Deng, H., & Mollah, A. (2018). *Investigating the critical success factors of digital transformation for improving customer experience* [Paper presentation]. *International Conference on Information Resources Management (CONF-IRM)*. Association for Information Systems.

Salgado, T., Tavares, J., & Oliveira, T. (2020). Drivers of mobile health acceptance and use from the patient perspective: survey study and quantitative model development. *JMIR mHealth and uHealth*, 8(7), e17588. <https://doi.org/10.2196/17588>

Samaradiwakara, G. D. M. N., & Gunawardena, C. G. (2014). Comparison of existing technology acceptance theories and models to suggest a well improved theory/model. *International technical sciences journal*, 1(1), 21-36.

Sanchez-Sepulveda, M., Fonseca, D., Franquesa, J. & Redondo, E. (2019). Virtual interactive innovations applied for digital urban transformations. Mixed approach. *Future Generation Computer Systems*, 91, 371-381.

<https://doi.org/10.1016/j.future.2018.08.016>

- Sandberg, J., Holmström, J., & Lyytinen, K. (2020). Digitisation and Phase Transitions in Platform Organising Logics: Evidence from the Process Automation Industry. *MIS Quarterly*, 44(1). <https://doi.org/10.25300/MISQ/2020/14520>
- Savastano, M., Amendola, C., Bellini, F. & D'Ascenzo, F. (2019). Contextual Impacts on industrial processes brought by the digital transformation of manufacturing: a systematic review. *Sustainability*, 11(3), 891. <https://doi.org/10.3390/su11030891>
- Schwab, K. (2017). *The Fourth Industrial Revolution*. Portfolio Penguin.
- Schwarz Müller, T., Brosi, P., Duman, D., & Welpel, I. M. (2018). How does the digital transformation affect organisations? Key themes of change in work design and leadership. *mrev management revue*, 29(2), 114-138. <https://doi.org/10.5771/0935-9915-2018-2-114>
- Schwertner, K. (2017). Digital transformation of business. *Trakia Journal of Sciences*, 15(1), 388-393. <https://doi.org/10.15547/tjs.2017.s.01.065>
- Sebastian, I. M., Ross, J. W., Beath, C., Mocker, M., Moloney, K. G., and Fonstad, N. O. 2017. How big old companies navigate digital transformation. *MIS Quarterly Executive* 16(3), 197-213.
- Sekayi, D. & Kennedy, A. (2017). Qualitative Delphi method: A four-round process with a worked example. *The Qualitative Report*, 22(10), 2755-2763. <https://doi.org/10.46743/2160-3715/2017.2974>
- Serajuddin, U., & Hamadeh, N. (2020). *New World Bank country classifications by income level: 2020-2021*. World Bank Blogs. <https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021>
- Shaheen, M., & Pradhan, S. (2019). Sampling in qualitative research. *Qualitative techniques for workplace data analysis* (pp. 25-51). IGI Global. <https://doi.org/10.4018/978-1-5225-5366-3.ch002>

- Shao, Z., & Li, X. (2022). The Influences of Three Task Characteristics on Innovative Use of Malleable IT: An Extension of Adaptive Structuration Theory for Individuals. *Information & Management*, 59(3), 103597. <https://doi.org/10.1016/j.im.2022.103597>
- Shiel, A., Violanti, M. T., & Slusarski, K. (2011). Explaining attitudes toward and experiences with social media among public information officers through adaptive structuration theory. *Communications of the IIMA*, 11(4), 4.
- Singh, S., Sharma, M., & Dhir, S. (2021). Modelling the effects of digital transformation in Indian manufacturing industry. *Technology in Society*, 67, 101763 2-11. <https://doi.org/10.1016/j.techsoc.2021.101763>
- Singh, V. & Walwyn, D. R. (2017). Influence of Personal Epistemology on Research Design: Influence on Research Education. *Journal of Research Practice*, 13(2), 2.
- Skinner, R., Nelson, R. R., Chin, W. W. & Land, L. (2015). The Delphi Method Research Strategy in Studies of Information Systems. *Cais*, 37, 2. <https://doi.org/10.17705/1CAIS.03702>
- Solis, B. & Littleton, A. (2017). *The 2017 state of digital transformation*. Altimeter. [http://library.meetliquid.com/wp-content/uploads/2018/02/Altimeter\\_DT2017.pdf](http://library.meetliquid.com/wp-content/uploads/2018/02/Altimeter_DT2017.pdf).
- Solis, B. & Szymanski, J. (2016). *The six stages of digital transformation maturity*. Altimeter, a Prophet Company. <https://www.cognizant.com/InsightsWhitepapers/the-six-stages-of-digital-transformation-maturity.pdf>
- Solis, B. (2019). *The 2018-2019 State of Digital Transformation*. Altimeter. <https://errolashwell.com/wp-content/uploads/2019/09/Altimeter-State-of-DT-Report-2019.pdf>
- Solis, B. (2019). *The Definition of Digital Transformation. The six stages of digital transformation*. <http://www.briansolis.com/2017/01/definition-of-digital-transformation/>

- Sousa, M. J. & Rocha, Á. (2019). Skills for disruptive digital business. *Journal of Business Research*, 94, 25–263. <https://doi.org/10.1016/j.jbusres.2017.12.051>
- Storey, D. J. (2016). *Understanding the small business sector* (e-book) (pp. 7-49). Routledge. <https://doi.org/10.4324/9781315544335>
- Strasser, A. (2017). Delphi Method Variants in Information Systems Research: Taxonomy Development and Application. *The Electronic Journal of Business Research Methods* 15 (2), 120-133.
- Strauss, A. L. (1987). *Qualitative Analysis for Social Scientists*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511557842>
- Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (pp. 101-162). Sage publications.
- Subramanian, K. P., Al-Haziazi, M., Rengarajan Veerasamy, D., & Aboraya, W. (2021). Digitalisation And Digital Transformation In Taking The Oman Academic Accreditation Route—A Critical Analysis For Oman-Based Educational Institutions. *International Journal of Management (IJM)*, 12(11), 45-64.
- Suwandi, M., Bayan, A. Y. M., & Taufiq, A. L. K. (2020). Financial Technology Optimisation in the Development of MSMEs with Spotlight Phenomenology. In *17th International Symposium on Management (INSYMA 2020)* (pp. 134-136). Atlantis Press.
- Swanson, R. A., & Chermack, T. J. (2013). *Theory building in applied disciplines*. Berrett-Koehler Publishers. (p. 4)
- Tan, B., Pan, S. L., Lu, X., & Huang, L. (2015). The role of IS capabilities in the development of multi-sided platforms: The digital ecosystem strategy of Alibaba. com. *Journal of the Association for Information systems*, 16(4), 248. <https://doi.org/10.17705/1jais.00393>

- Tan, F., & Sedera, D. (2007). Conceptualising interaction with ERP systems using adaptive structuration theory. *Proceedings of the International Conference on Information Systems* (1-10). Queen's School of Business.
- Tarutė, A., Duobienė, J., Kloviėnė, L., Vitkauskaitė, E. & Varaniūtė, V. (2018). Identifying factors affecting digital transformation of SMEs. *Proceedings ICEB 2018*. 64. <https://aisel.aisnet.org/iceb2018/64>
- Tavakoli, A., & Schlagwein, D. (2016). A review of the use of practice theory in information systems research. [Paper Presentation] PACIS 2016, 267
- Tavella, E., Papadopoulos, T., & Paroutis, S. (2021). Artefact appropriation in facilitated modelling: An adaptive structuration theory approach. *Journal of the Operational Research Society*, 72(11), 2381-2395. <https://doi.org/10.1080/01605682.2020.1790308>
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, 18(7), 509-533. [https://doi.org/10.1002/\(SICI\)1097-0266\(199708\)18:7<509::AID-SMJ882>3.0.CO;2-Z](https://doi.org/10.1002/(SICI)1097-0266(199708)18:7<509::AID-SMJ882>3.0.CO;2-Z)
- Teichert, R. (2019). Digital transformation maturity: A systematic review of literature. *Acta universitatis agriculturae et silviculturae mendelianae brunensis*. 67(6), 1673–1687. <https://doi.org/10.11118/actaun201967061673>
- Tenny, S., Brannan, G. D., Brannan, J. M., & Sharts-Hopko, N. C. (2017). Qualitative study. <https://europepmc.org/article/NBK/nbk470395>
- Thapa, S., Voola, A., & Yesseleva-Pionka, M. (2022). Leadership and digital communication in Australian SMEs amid COVID-19. *Journal of the International Council for Small Business*, 3(1), 50-55. <https://doi.org/10.1080/26437015.2021.1944793>
- Thu, S. N., & Namusonge, M. (2017). Determinants of adoption and usage of ICT by small and medium enterprises in Kenya: The case of Kikuyu Sub-County in Kiambu County. *European journal of business and strategic management*, 2(1), 15-28.

- Tiberius, V., & Hirth, S. (2019). Impacts of digitisation on auditing: A Delphi study for Germany. *Journal of International Accounting, Auditing and Taxation*, 37, 100288. <https://doi.org/10.1016/j.intaccaudtax.2019.100288>
- Tilson, D., Lyytinen, K., & Sørensen, C. (2010). Research commentary—Digital infrastructures: The missing IS research agenda. *Information systems research*, 21(4), 748-759. <https://doi.org/10.1287/isre.1100.0318>
- Tornatzky, L. G., Fleischer, M., & Chakrabarti, A. K. (1990). *Processes of technological innovation*. Lexington Books, Lexington, MA
- Ulas, D. (2019). Digital transformation process and SMEs. *Procedia Computer Science*, 158, 662-671. <https://doi.org/10.1016/j.procs.2019.09.101>
- Umeh, F., Tan, C., Pan, Y. C., & Khan, H. T. (2020). *Developing the digital business readiness assessment framework (DBRAF) for fashion retail SMEs in Lagos, Nigeria* [Paper presentation]. 25th UK Academy for Information Systems International Conference (UKAIS 2020), Oxford, UK.
- USC Libraries (2022). *Theoretical framework*. Organizing Your Social Sciences Research Paper, Research Guides. <https://libguides.usc.edu/writingguide/theoreticalframework>
- Vaismoradi, M., & Snelgrove, S. (2019). Theme in qualitative content analysis and thematic analysis. *Forum Qualitative Sozialforschung [Forum: Qualitative Social Research]* 20(3) 23
- Van Dyk, R., & Van Belle, J. P. (2019, September). Factors influencing the intended adoption of digital transformation: a South African case study. *Proceedings of the 2019 Federated Conference on Computer Science and Information Systems (FedCSIS)* (pp. 519-528). IEEE.

- Van Veldhoven, Z., & Vanthienen, J. (2019). Designing a Comprehensive Understanding of Digital Transformation and its Impact. *Bled eConference*, 22. <https://doi.org/10.18690/978-961-286-280-0.39>
- Veeraya, S., Jeyakumar, R., & Hassan, H., (2021). Digital leadership impact amongst Malaysian small and medium enterprises employees towards digital business transformation. *Proceedings of the 2nd Conference on Managing Digital Industry, Technology and Entrepreneurship (CoMDITE 2021)*, 131.
- Venkatesh, V. & Bala, H. (2008). Technology acceptance model 3 and a research agenda on interventions. *Decision Sciences*, 39(2), 273-315. <https://doi.org/10.1111/j.1540-5915.2008.00192.x>
- Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. (2003). User Acceptance of Information Technology: Toward a unified view. *MIS Quarterly*, 27(3). 425–478. <https://doi.org/10.1017/CBO9781107415324.004>
- Venkatesh, V., Thong, J. Y., & Xu, X. (2012). Consumer acceptance and use of information technology: extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 157-178. <https://doi.org/10.2307/41410412>
- Verdinelli, S., & Scagnoli, N. I. (2013). Data display in qualitative research. *International Journal of Qualitative Methods*, 12(1), 359-381.
- Verhoef, P. C., Broekhuizen, T., Bart, Y., Bhattacharya, A., Dong, J. Q., Fabian, N., & Haenlein, M. (2021). Digital transformation: A multidisciplinary reflection and research agenda. *Journal of Business Research*, 122, 889-901. <https://doi.org/10.1016/j.jbusres.2019.09.022>
- Verina, N., & Titko, J. (2019). Digital transformation: conceptual framework. Contemporary Issues in Business, Management and Economics Engineering, *Proceedings of the*

*International Scientific Conference 2019*. Vilnius, Lithuania (pp. 9-10).

<https://doi.org/10.3846/cibmee.2019.073>

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, 28(2), 118-144.

<https://doi.org/10.1016/j.jsis.2019.01.003>

Viglia, G., Pera, R. & Bigné, E. (2018). The determinants of stakeholder engagement in digital platforms. *Journal of Business Research*, 89, 404-410.

<https://doi.org/10.1016/j.jbusres.2017.12.029>

Vincent, S., & O'Mahoney, J. (2018). *Critical realism and qualitative research: An introductory overview*. The Sage handbook of qualitative business and management research methods: History and traditions, 201-216.

<https://doi.org/10.4135/9781526430212.n13>

Vollstedt, M., & Rezat, S. (2019). An introduction to grounded theory with a special focus on axial coding and the coding paradigm. *Compendium for early career researchers in mathematics education*, 13, 81-100. [https://doi.org/10.1007/978-3-030-15636-7\\_4](https://doi.org/10.1007/978-3-030-15636-7_4)

vom Brocke, J., Schmid, A. M., Simons, A., & Safrudin, N. (2021). IT-enabled organizational transformation: a structured literature review. *Business Process Management Journal*, 27(1), 204-229.

Wade, M. (2015). *Digital business transformation: a conceptual framework*. Global Center for Digital Business Transformation, 15. <https://www.imd.org/research-knowledge/reports/framework/>

Wade, M., Noronha, A., Macaulay, J. & Barbier, J. (2017). *Orchestrating digital business transformation*. Global Center for Digital Business Transformation. <https://www.imd.org/research-knowledge/reports/digital-orchestra/>

- Waheed, Z., Kiazai, A. N., & Bahadur, W. (2020). Ethics and validity as core issues in qualitative research: a review paper. *Pakistan Journal of Educational Research*, 3(2). <https://doi.org/10.52337/pjer.v3i2.42>
- Wang, B., Liu, Y., & Parker, S. K. (2020). How does the use of information communication technology affect individuals? A work design perspective. *Academy of Management Annals*, 14(2), 695-725. <https://doi.org/10.5465/annals.2018.0127>
- Wang, V. C. & Reio, T. G. (Eds.). (2017). *Handbook of research on innovative techniques, trends, and analysis for optimised research methods*. (pp. 233-257). IGI Global. <https://doi.org/10.4018/978-1-5225-5164-5>
- Wang, Y. (2016). What are the biggest obstacles to growth of SMEs in developing countries? - An empirical evidence from an enterprise survey. *Borsa Istanbul Review*, 16(3), 167-176. <https://doi.org/10.1016/j.bir.2016.06.001>
- Wang, Y., Kung, L. & Byrd, T. A. (2018). Big data analytics: Understanding its capabilities and potential benefits for healthcare organisations. *Technological Forecasting and Social Change*, 126, 3-13. <https://doi.org/10.1016/j.techfore.2015.12.019>
- Wang, Y., & Su, X. (2021). Driving factors of digital transformation for manufacturing enterprises: a multi-case study from China. *International Journal of Technology Management*, 87(2-4), 229-253. <https://doi.org/10.1504/IJTM.2021.120932>
- Ward, J., & Elvin, R. (1999). A new framework for managing IT-enabled business change. *Information systems journal*, 9(3), 197-221.
- Warner, K. S. & Wäger, M. (2019). Building dynamic capabilities for digital transformation: An ongoing process of strategic renewal. *Long Range Planning*, 52(3), 326-349. <https://doi.org/10.1016/j.lrp.2018.12.001>

- Weritz, P., Braojos, J., & Matute, J. (2020). *Exploring the Antecedents of Digital Transformation: Dynamic Capabilities and Digital Culture Aspects to Achieve Digital Maturity*. [Paper Presentation] AMCIS 2020
- Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic management journal*, 5(2), 171-180. <https://doi.org/10.1002/smj.4250050207>
- Wessel, L., Baiyere, A., Ologeanu-Taddei, R., Cha, J., & Blegind-Jensen, T. (2021). Unpacking the difference between digital transformation and IT-enabled organizational transformation. *Journal of the Association for Information Systems*, 22(1), 102-129.
- Westerman, G., Calm ejane, C., Bonnet, D., Ferraris, P., & McAfee, A. (2011). Digital Transformation: A roadmap for billion-dollar organisations. *MIT Center for digital business and capgemini consulting*, 1, 1-68.
- Wiliandri, R. (2020). A conceptual approach to identify factors affecting the digital transformation of micro, small and medium-sized enterprises (MSMEs) during COVID-19 pandemic in Indonesia. *Ekonomi Bisnis*, 25(2), 66-85. <https://doi.org/10.17977/um042v25i2p66-85>
- World Bank (2020). The World by Income and Region. <https://datatopics.worldbank.org/world-development-indicators/the-world-by-income-and-region.html>
- World Bank (2022). The World Bank Country Classifications. <https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups>
- Wright, S., O'Brien, B. C., Nimmon, L., Law, M. & Mylopoulos, M. (2016). Research design considerations. *Journal of graduate medical education*, 8(1), 97. <https://doi.org/10.4300/JGME-D-15-00566.1>

- Wu, M., Kozanoglu, D. C., Min, C., & Zhang, Y. (2021). Unravelling the capabilities that enable digital transformation: A data-driven methodology and the case of artificial intelligence. *Advanced Engineering Informatics*, 50, 101368. <https://doi.org/10.1016/j.aei.2021.101368>
- Wynn, Jr, D. E., & Williams, C. K. (2020). Recent advances and opportunities for improving critical realism-based case study research in IS. *Journal of the Association for Information Systems*, 21(1), 8. <https://doi.org/10.17705/1jais.00592>
- Xu, Y., Li, H., Yu, L., Zha, S., He, W., & Hong, C. (2021). Influence of mobile devices' scalability on individual perceived learning. *Behaviour & Information Technology*, 40(11), 1137-1153.
- Yang, D., Wang, A. X., Zhou, K. Z., & Jiang, W. (2019). Environmental strategy, institutional force, and innovation capability: A managerial cognition perspective. *Journal of Business Ethics*, 159(4), 1147-1161. <https://doi.org/10.1007/s10551-018-3830-5>
- Yawised, K., Apasrawirote, D., Chatrangsan, M., & Muneesawang, P. (2022). Factors Affecting SMEs' Intention to Adopt a Mobile Travel Application based on the Unified Theory of Acceptance and Use of Technology (UTAUT-2). *Emerging Science Journal*, 4, 207-224. <https://doi.org/10.28991/esj-2021-SP1-014>
- Yilmaz, K. (2013). Comparison of quantitative and qualitative research traditions: Epistemological, theoretical, and methodological differences. *European Journal of Education*, 48(2), 311-325. <https://doi.org/10.1111/ejed.12014>
- Yin, R. K. (2011). *Qualitative research from start to finish*. New York, NY: Guilford Press
- Yli-Huumo, J., & Smolander, K. (2017, May). Changes and challenges of technical debt and its management during ongoing digital transformation. *Proceedings of the XP2017 Scientific Workshops* (pp. 1-4).

- Yoo, S. K., & Kim, B. Y. (2019). The effective factors of cloud computing adoption success in organisation. *The Journal of Asian Finance, Economics and Business*, 6(1), 217-229. <https://doi.org/10.13106/jafeb.2019.vol6.no1.217>
- Yoo, Y., Henfridsson, O., & Lyytinen, K. (2010). Research commentary—the new organising logic of digital innovation: an agenda for information systems research. *Information systems research*, 21(4), 724-735.
- Yousaf, Z., Radulescu, M., Sinisi, C. I., Serbanescu, L., & Păunescu, L. M. (2021). Towards sustainable digital innovation of SMEs from the developing countries in the context of the digital economy and frugal environment. *Sustainability*, 13(10), 5715.
- Yunis, M., Tarhini, A. & Kassar, A. (2018). The role of ICT and innovation in enhancing organisational performance: The catalysing effect of corporate entrepreneurship. *Journal of Business Research*, 88, 344–356. <https://doi.org/10.1016/j.jbusres.2017.12.030>
- Zaki, M. (2019). Digital transformation: harnessing digital technologies for the next generation of services. *Journal of Services Marketing*, 33 (4), 429–435. <https://doi.org/10.1108/JSM-01-2019-0034>
- Zaoui, F., & Souissi, N. (2020). Roadmap for digital transformation: A literature review. *Procedia Computer Science*, 175, 621-628. <https://doi.org/10.1016/j.procs.2020.07.090>
- Zhang, X., Gao, C., & Zhang, S. (2022). The niche evolution of cross-boundary innovation for Chinese SMEs in the context of digital transformation - Case study based on dynamic capability. *Technology in Society*, 101870. <https://doi.org/10.1016/j.techsoc.2022.101870>
- Zhang, X., Xu, Y., & Ma, L. (2022). Research on Successful Factors and Influencing Mechanism of the Digital Transformation in SMEs. *Sustainability*, 14(5), 2549. <https://doi.org/10.3390/su14052549>

Zhou, S. S., Zhou, A. J., Feng, J., & Jiang, S. (2019). Dynamic capabilities and organisational performance: The mediating role of innovation. *Journal of Management & Organisation*, 25(5), 731-747. <https://doi.org/10.1017/jmo.2017.20>

Zincir, O. (2020). A Framework Development Effort for Using Online Communities in an Open Innovation Understanding. In *Business Management and Communication Perspectives in Industry 4.0* (pp. 52-70). IGI Global. <https://doi.org/10.4018/978-1-5225-9416-1.ch004>

Ziyadin, S., Suieubayeva, S., & Utegenova, A. (2019). Digital transformation in business. In *International Scientific Conference “Digital Transformation of the Economy: Challenges, Trends, New Opportunities”* (pp. 408-415). Springer, Cham. [https://doi.org/10.1007/978-3-030-27015-5\\_49](https://doi.org/10.1007/978-3-030-27015-5_49)



## APPENDICES

### Appendix 1

#### Questionnaire for Delphi Round One

##### INTRODUCTION:

Your participation is humbly requested in this Delphi Research towards a doctoral thesis in Information Systems. This invitation acknowledges your knowledge, expertise, experience, and free will to participate. Your participation will be completely confidential, and you will remain completely anonymous throughout this process.

The Delphi process involves questioning you on three separate occasions:

- Round 1: Some general open-ended questions will be submitted to you requiring your response (Brainstorming). These are provided below for you to respond to now.

To be responded to later:

- Round 2: Your answers (and those from the other panellists) from round 1 will be summarised and formulated into a series of more specific questions, to which you will be asked to respond.
- Round 3: Round 2's questions will be submitted to you again, but this time you will also be able to see the other panellists' average reply, and you will then be asked if you would like to adjust your answer from the second round or not.

The identity of all panellists will always remain confidential.

For this Brainstorming Session (Round 1), you are expected to respond based on your knowledge, expertise, and experience.

Please provide as many responses and details as possible for each question, without limitation but honestly.

The study's context is Developing Countries or Developing Economies, and the target organisations are Small and Medium Enterprises (SMEs).

Some terminologies used in the questionnaire are clarified as follows:

"SMEs" are firms employing up to 249 persons, with the following breakdown: micro (1 to 9), small (10 to 49), and medium (50 to 249).

"Digitalisation" is the act and process of integrating digital technologies into everyday life, whether organisational, societal, or business, involving the adoption, implementation, or use of digital technologies and digitisation to modify and improve existing activities, processes, functions, models, and outcomes.

"Digital transformation" is the profound and accelerating transformation of organisational, societal, or business activities, processes, competencies, functions, and models to fully leverage the changes and opportunities of digital technologies through digitalisation and their outcomes across organisations, societies or businesses in a strategic and prioritised way.

"Drivers" are what push, motivate, compel, or convince individuals or organisations to go for digital technologies, digitalisation, and digital transformation.

"Processes" are the activities, steps, procedures, methods, or phases that ensure digitalisation and transformation.

"Outcomes" are simply the effects or consequences of digitalisation and digital transformation, and they could be positive or negative, long-term or short-term.

Thank you for accepting to participate.



PRELIMINARY QUESTIONS:

- i. Email address: This form collects email addresses. Change settings.
- ii. What is your age range? (select one)  
20+ to 30, 30+ to 40, 40+ to 50, 50+ to 60, 60+ to 70.
- iii. What is your Area of Expertise?
- iv. What is your Position or Role in Your Organisation?
- v. What is your Organisation?
- vi. What is the Industry or Business Type of your organisation?
- vii. What is your Country?

MAIN QUESTIONS

1. What digital technologies or information technologies/systems are adopted or used by SMEs in developing countries to digitalise or transform their operations?
2. What drivers would make SMEs in developing countries digitalise their operations or pursue digital transformation? In other words, in your opinion, what would make SMEs adopt, implement, or use information technologies or systems in their operations, or what pushes them to do so?
3. What are the processes involved in the digital transformation of SMEs in developing countries? In other words, what do SMEs go through to adopt, implement, and use digital technologies or information technologies/systems in terms of activities, processes, stages, and decisions?
4. What are the outcomes of the digital transformation of SMEs in developing countries? In other words, what specific outcomes (negative or positive) result from adopting, implementing, and using digital technologies or information technologies/systems and digital transformation of SMEs?

5. Are there any relationships among the drivers, processes and outcomes mentioned above? In other words, do you see any influences between drivers and processes, processes and outcomes, and drivers and outcomes?
6. What are the SMEs' managerial and organisational capabilities and capacities involved in the digital transformation of SMEs in developing countries?
7. Are there any relationships or influences between the capacities and capabilities mentioned above and the digital transformation drivers, processes, and outcomes.?

END OF QUESTIONS

Thank you



## Appendix 2

### Questionnaire for Delphi Round Two

#### INTRODUCTION:

This questionnaire is the second round of questions meant to refine and improve our previous responses.

The same questions as in Round 1 are presented this time as close-ended with MULTIPLE CHOICE, and a few more added as open-ended

For each of the following questions, answers are provided that are not in any particular order.

Please TICK or select ONLY the answers you AGREE WITH or consider CORRECT.

You can also suggest an additional answer(s) under the *'other option.'*

Please LEAVE BLANK all answers you are NOT SURE OF or think ARE WRONG.

#### MAIN QUESTIONS

1. What digital technologies or information technologies/systems are commonly adopted, implemented, or used by SMEs in developing countries to digitalise or transform their operations?
  - a. Mobile Computing (Applications and Devices) (e.g., Mobile apps, Tablets, Smartphones).
  - b. Desktop Computing (Applications and Devices) (e.g., Enterprise systems like ERP, CRM, MRP, Desktop apps, Desktops, Laptops, Servers, etc.).
  - c. Cloud Computing (Software, Platform, Infrastructure), Applications, Data Storage and Servers. e.g., Online Enterprise systems (ERP) such as Ecount ERP, Online

data storage systems such as Google Drive, Dropbox, etc. Online Office systems such as Office 365, etc., and Online servers.

- d. Social media platforms and networks (social networks, media sharing, blogging, forum), e.g., Facebook, Twitter, YouTube, etc., for marketing purposes and contacting customers.
  - e. E-commerce platforms and Websites (Public and Private), e.g., Tonaton, Jumia, Olx, etc., for sales and adverts, a business website for advertising or e-commerce.
  - f. Virtual/Remote Meeting/Support Systems (e.g., Zoom, Microsoft Teams, Google Meet AnyDesk, TeamViewer, UltraViewer, or others in Tele and Video conferencing).
  - g. Communications apps and chat tools (voice, text, video), E.g., Skype, WhatsApp, WeChat.
  - h. Big Data/Analytics (e.g., analysing/leveraging data, analytical systems or software for forecasting and predicting business trends and performance from data gathered).
  - i. Artificial Intelligence (AI), E.g., Chatbots, Machine learning, etc.
  - j. Internet of Things (IoT): Intelligent equipment and access control.
  - k. Robotics and Drones; for delivery, surveillance, pictorial coverage, etc.
  - l. Additive manufacturing: 3D printing, etc.
  - m. Blockchain: Bitcoin, etc.
  - n. Other (specify).
2. What drivers would make SMEs in developing countries digitalise their operations or pursue digital transformation? In other words, in your opinion, what would make SMEs adopt, implement, or use information technologies or systems in their operations, or what pushes them to do so?
- a. The updatability and rapidly changing development of digital technology.

- b. The comprehensiveness and integrative nature of digital technologies.
- c. The customisability and adaptability of digital technologies.
- d. The Availability and accessibility of digital technologies.
- e. The ease of use, flexibility, and convenience of digital technologies.
- f. The efficiency and effectiveness of digital technologies.
- g. Timeliness and Accuracy of digital technologies.
- h. Leadership style, interest, and drive of management.
- i. Reducing, optimising, and containing costs.
- j. Increase productivity and performance.
- k. To Change the business model and create value.
- l. Customer demand and satisfaction.
- m. Competition and Survival.
- n. Industry, regulation, and government requirements and demands.
- o. Resources, size, capacity, and capabilities of the organisation.
- p. Task accomplishment and process improvements.
- q. Beliefs, values, mission, and vision of the organisation.
- r. The Brand, Image, and reputation of the organisation.
- s. Positive outcomes of limited use.
- t. Knowledge and experience of leaders and employees.
- u. New and rapid trends, ways and approaches to digital technologies and working.
- v. Change in work patterns, work attitude, and culture.
- w. Change in the decision and organisational structures.
- x. Introduction of new rules for operation.
- y. Introduction of new resources.
- z. Task content, nature, facilitators, and constraints.

- aa. Other (specify).
3. What are the processes involved in the digital transformation of SMEs in developing countries? In other words, what do SMEs go through to adopt, implement, and use digital technologies or information technologies/systems in terms of activities, processes, stages, decisions, etc.?
- a. Needs analysis/assessment, problem identification, and Business Case.
  - b. Industry scan, Benchmarking, requirement gathering.
  - c. Awareness creation, Stakeholder engagement, change management.
  - d. Procurement/Acquisition, Design, Development, Outsourcing.
  - e. Deployment, Implementation, installation, and configuration.
  - f. Piloting, Testing.
  - g. Training, orientation.
  - h. Changes to resources and structures.
  - i. Digitalisation and Technological adaptation.
  - j. Changes to functions, processes, and operations.
  - k. Skills and resource alignment.
  - l. Use and maintenance.
  - m. Customer and competitor response.
  - n. Decision-making and adoption.
  - o. Strategic shifts & positioning.
  - p. Adjustment and Business model development.
  - q. Other (specify).
4. What are the outcomes of the digital transformation of SMEs in developing countries? In other words, what specific outcomes (negative or positive) result from adopting,



implementing, and using digital technologies or information technologies/systems and digital transformation of SMEs?

- a. Increase in productivity and efficiency.
- b. Improvement in customer satisfaction and customer retention.
- c. Improvement in market share and business growth.
- d. Ease of working and management.
- e. Cost savings and losses reduction.
- f. Timeliness and time-saving.
- g. Business differentiation & Competitive advantage.
- h. Enhancement of Business image.
- i. Facilitate knowledge and skill development.
- j. Enhancement of product and service values.
- k. Enhanced work patterns, work attitude, and culture.
- l. Increase in Profitability and Return on Investment (ROI).
- m. Job Simplification, Performance and Effectiveness.
- n. Task Performance and Innovation.
- o. Decision effectiveness and usefulness.
- p. Incremental and additional sales.
- q. Awareness / Recall / Learning.
- r. Risks, hazards, health, and safety challenges.
- s. Loss of job and employment.
- t. Challenges with security and privacy.
- u. High implementation and maintenance costs.
- v. Misuse and misappropriation of technology.
- w. Redundancy of skills and resources.

- x. Other (specify).
5. What are the SMEs' managerial and organisational capabilities and capacities' influence on digital transformation in developing countries? In other words, what managerial capabilities and capacities issues (knowledge, skills, competence, style, cognition, social network, industrial network, human capital, beliefs, values, and principles) can help or facilitate the adoption? Or what organisational capabilities and capacities issues (structure, size, resources, infrastructure, strategy, industry standards) can help implement and use digital technologies or information technologies/systems in SMEs?
- a. Technical and Conceptual skill set of the human capital.
  - b. Digital leader, digital strategist.
  - c. Customer-centric management.
  - d. Change-minded management and adaptation to change.
  - e. Organisations capital adequacy.
  - f. Management beliefs, values, and principles.
  - g. Sensitivity and response to market changes.
  - h. Stimulating stakeholders' active participation.
  - i. External informal and formal network relationships.
  - j. Internal relationships and networks with employees.
  - k. Knowledge possessed by managers.
  - l. Experience possessed by managers.
  - m. Skills of managers.
  - n. Education of managers.
  - o. Training of personnel.
  - p. Understandability of management.
  - q. Ability to recognise and seize an opportunity.

- r. Ability to reconfigure resources.
  - s. Type of Industry, sector, and operational type.
  - t. Organisational resources are available.
  - u. Size and structure of business operation.
  - v. Cost leadership capabilities.
  - w. Market leadership capabilities.
  - x. Channel management capabilities.
  - y. Development or acquisition of IT infrastructure.
  - z. Development or sourcing of IT human resource capability.
  - aa. Pillars of competitive advantage.
  - bb. New service delivery capabilities.
  - cc. Research and development output.
  - dd. Digital technology competence.
  - ee. Other (specify).
6. Can the DRIVERS, as listed in question 2, influence the PROCESSES, as listed in question 3? Answer by showing which driver(s) influence which process(es). Provide the answer in the following format: 2a can influence 3c, or 2a 2c 2e can influence 3c 3f 3g (Indicate as many influences as possible per your opinion).
7. Can the PROCESSES listed in question 3 influence the OUTCOMES listed in question 4? Answer by showing which process(es) influence which outcome(s). Provide the answer in the following format: 3a can influence 4c, or 3a 3c 3e can influence 4c 4f 4g (Indicate as many influences as possible per your opinion).
8. Can the DRIVERS, as listed in question 2, influence the OUTCOMES as listed in question 4? Answer by showing which driver(s) influence which outcome(s). Provide the answer

in the following format: 2a can influence 4c, or 2a 2c 2e can influence 4c 4f 4g (Indicate as many influences as possible per your opinion).

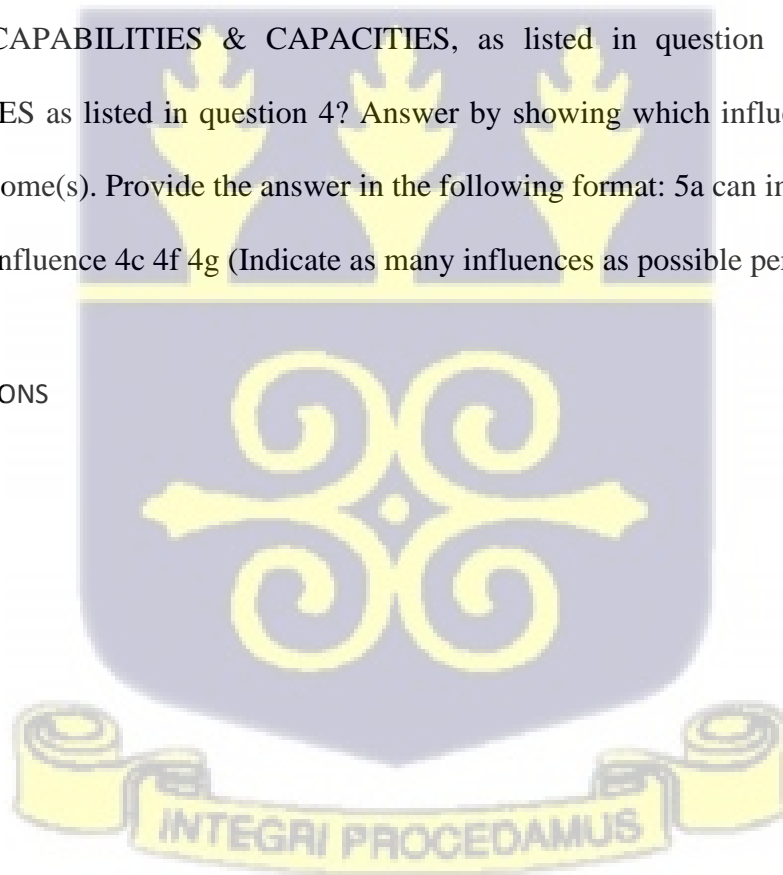
9. Can the CAPABILITIES & CAPACITIES listed in question 5 influence the DRIVERS listed in question 2? Answer by showing which influence(s) influences which driver(s). Provide the answer in the following format: 5a can influence 2c, or 5a 5c 5e can influence 2c 2f 2g (Indicate as many influences as possible per your opinion).

10. Can the CAPABILITIES & CAPACITIES listed in question 5 influence the PROCESSES listed in question 3? Answer by showing which influence(s) influence which process(es). Provide the answer in the following format: 5a can influence 3c, or 5a 5c 5e can influence 3c 3f 3g (Indicate as many influences as possible per your opinion).

11. Can the CAPABILITIES & CAPACITIES, as listed in question 5, influence the OUTCOMES as listed in question 4? Answer by showing which influence(s) influence which outcome(s). Provide the answer in the following format: 5a can influence 2c or 5a, 5c 5e can influence 4c 4f 4g (Indicate as many influences as possible per your opinion).

END OF QUESTIONS

Thank you



### Appendix 3

#### Questionnaire for Delphi Round Three

##### INTRODUCTION:

Dear one, this is the third round of questions meant to refine and improve your previous responses and help confirm the responses.

The same questions as in Round 2 are presented with slight modifications, resulting from the feedback of round 2.

For each of the following questions, answers are provided that are not in any particular order.

Please TICK or select ONLY the answers you AGREE WITH or consider CORRECT.

You can also suggest an additional answer(s) under the '*other option.*'

Please LEAVE BLANK all answers you are NOT SURE OF or think ARE WRONG.

##### MAIN QUESTIONS

1. What digital technologies or information technologies/systems are commonly adopted, implemented, or used by SMEs in developing countries to digitalise or transform their operations?
  - a. Mobile Computing (Applications and Devices) (e.g., Mobile apps, Tablets, Smartphones).
  - b. Desktop Computing (Applications and Devices) (e.g., Enterprise systems like ERP, CRM, MRP, Desktop apps, Desktops, Laptops, Servers, etc.).
  - c. Cloud Computing (Software, Platform, Infrastructure), Applications, Data Storage and Servers. e.g., Online Enterprise systems (ERP) such as Ecount

ERP, Online data storage systems such as Google Drive, Dropbox, etc. Online Office systems such as Office 365, etc., and Online servers.

- d. Social media platforms and networks (social networks, media sharing, blogging, forum), e.g., Facebook, Twitter, YouTube, etc., for marketing purposes and contacting customers.
- e. E-commerce platforms and Websites (Public and Private), e.g., Tonaton, Jumia, Olx, etc., for sales and adverts, a business website for advertising or e-commerce.
- f. Virtual/Remote Meeting/Support Systems (e.g., Zoom, Microsoft Teams, Google Meet AnyDesk, TeamViewer, UltraViewer, or others in Tele and Video conferencing).
- g. Communications apps and chat tools (voice, text, video), E.g., Skype, WhatsApp, WeChat.
- h. Big Data/Analytics (e.g., analysing/leveraging data, analytical systems or software for forecasting and predicting business trends and performance from data gathered).
- i. Artificial Intelligence (AI), E.g., Chatbots, Machine learning, etc.
- j. Internet of Things (IoT): Intelligent equipment and access control.
- k. Robotics and Drones; for delivery, surveillance, pictorial coverage, etc.
- l. Additive manufacturing: 3D printing, etc.
- m. Blockchain: Bitcoin, etc.
- n. Other (specify).

2. What drivers would make SMEs in developing countries digitalise their operations or pursue digital transformation? In other words, in your opinion, what would make

SMEs adopt, implement, or use information technologies or systems in their operations, or what pushes them to do so?

- a. The updatability and rapidly changing development of digital technology.
- b. The comprehensiveness and integrative nature of digital technologies.
- c. The customisability and adaptability of digital technologies.
- d. The Availability and accessibility of digital technologies.
- e. The ease of use, flexibility, and convenience of digital technologies.
- f. The efficiency and effectiveness of digital technologies.
- g. Timeliness and Accuracy of digital technologies.
- h. Leadership style, interest, and drive of management.
- i. Reducing, optimising, and containing costs.
- j. Increase productivity and performance.
- k. To Change the business model and create value.
- l. Customer demand and satisfaction.
- m. Competition and Survival.
- n. Industry, regulation, and government requirements and demands.
- o. Resources, size, capacity, and capabilities of the organisation.
- p. Task accomplishment and process improvements.
- q. Beliefs, values, mission, and vision of the organisation.
- r. The Brand, Image, and reputation of the organisation.
- s. Positive outcomes of limited use.
- t. Knowledge and experience of leaders and employees.
- u. New and rapid trends, ways and approaches to digital technologies and working.
- v. Change in work patterns, work attitude, and culture.

- w. Change in the decision and organisational structures.
  - x. Introduction of new rules for operation.
  - y. Introduction of new resources.
  - z. Task content, nature, facilitators, and constraints.
  - aa. Other (specify).
3. What are the processes involved in the digital transformation of SMEs in developing countries? In other words, what do SMEs go through to adopt, implement, and use digital technologies or information technologies/systems in terms of activities, processes, stages, decisions, etc.?
- a. Needs analysis/assessment, problem identification, and Business Case.
  - b. Industry scan, Benchmarking, requirement gathering.
  - c. Awareness creation, Stakeholder engagement, change management.
  - d. Procurement/Acquisition, Design, Development, Outsourcing.
  - e. Deployment, Implementation, installation, and configuration.
  - f. Piloting, Testing.
  - g. Training, orientation.
  - h. Changes to resources and structures.
  - i. Digitalisation and Technological adaptation.
  - j. Changes to functions, processes, and operations.
  - k. Skills and resource alignment.
  - l. Use and maintenance.
  - m. Customer and competitor response.
  - n. Decision-making and adoption.
  - o. Strategic shifts & positioning.
  - p. Adjustment and Business model development.

q. Other (specify).

4. What are the outcomes of the digital transformation of SMEs in developing countries?

In other words, what specific outcomes (negative or positive) result from adopting, implementing, and using digital technologies or information technologies/systems and digital transformation of SMEs?

- a. Increase in productivity and efficiency.
- b. Improvement in customer satisfaction and customer retention.
- c. Improvement in market share and business growth.
- d. Ease of working and management.
- e. Cost savings and losses reduction.
- f. Timeliness and time-saving.
- g. Business differentiation & Competitive advantage.
- h. Enhancement of Business image.
- i. Facilitate knowledge and skill development.
- j. Enhancement of product and service values.
- k. Enhanced work patterns, work attitude, and culture.
- l. Increase in Profitability and Return on Investment (ROI).
- m. Job Simplification, Performance and Effectiveness.
- n. Task Performance and Innovation.
- o. Decision effectiveness and usefulness.
- p. Incremental and additional sales.
- q. Awareness / Recall / Learning.
- r. Risks, hazards, health, and safety challenges.
- s. Loss of job and employment.
- t. Challenges with security and privacy.

- u. High implementation and maintenance costs.
  - v. Misuse and misappropriation of technology.
  - w. Redundancy of skills and resources.
  - x. Other (specify).
5. What are the SMEs' managerial and organisational capabilities and capacities' influence on digital transformation in developing countries? In other words, what managerial capabilities and capacities issues (knowledge, skills, competence, style, cognition, social network, industrial network, human capital, beliefs, values, and principles) can help or facilitate the adoption? Or what organisational capabilities and capacities issues (structure, size, resources, infrastructure, strategy, industry standards) can help implement and use digital technologies or information technologies/systems in SMEs?
- a. Technical and Conceptual skill set of the human capital.
  - b. Digital leader, digital strategist.
  - c. Customer-centric management.
  - d. Change-minded management and adaptation to change.
  - e. Organisations capital adequacy.
  - f. Management beliefs, values, and principles.
  - g. Sensitivity and response to market changes.
  - h. Stimulating stakeholders' active participation.
  - i. External informal and formal network relationships.
  - j. Internal relationships and networks with employees.
  - k. Knowledge possessed by managers.
  - l. Experience possessed by managers.
  - m. Skills of managers.

- n. Education of managers.
  - o. Training of personnel.
  - p. Understandability of management.
  - q. Ability to recognise and seize an opportunity.
  - r. Ability to reconfigure resources.
  - s. Type of Industry, sector, and operational type.
  - t. Organisational resources are available.
  - u. Size and structure of business operation.
  - v. Cost leadership capabilities.
  - w. Market leadership capabilities.
  - x. Channel management capabilities.
  - y. Development or acquisition of IT infrastructure.
  - z. Development or sourcing of IT human resource capability.
  - aa. Pillars of competitive advantage.
  - bb. New service delivery capabilities.
  - cc. Research and development output.
  - dd. Digital technology competence.
  - ee. Other (specify).
6. Can the DRIVERS, as listed in question 2, influence the PROCESSES, as listed in question 3? Answer by showing which driver(s) influence which process(es). Provide the answer in the following format: 2a can influence 3c, or 2a 2c 2e can influence 3c 3f 3g (Indicate as many influences as possible per your opinion).
7. Can the PROCESSES listed in question 3 influence the OUTCOMES listed in question 4? Answer by showing which process(es) influence which outcome(s). Provide the

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8. Can the DRIVERS, as listed in question 2, influence the OUTCOMES as listed in question 4? Answer by showing which driver(s) influence which outcome(s). Provide the answer in the following format: 2a can influence 4c, or 2a 2c 2e can influence 4c 4f 4g (Indicate as many influences as possible per your opinion).
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Can the CAPABILITIES & CAPACITIES, as listed in question 5, influence the OUTCOMES as listed in question 4? Answer by showing which influence(s) influence which outcome(s). Provide the answer in the following format: 5a can influence 2c or 5a, 5c 5e can influence 4c 4f 4g (Indicate as many influences as possible per your opinion).

END OF QUESTIONS

Thank you



## Appendix 4

### Interview Guide

#### INTRODUCTION

This interview is a follow-up to the questionnaire you responded to earlier.

The study is academic qualitative research on the digital transformation of SMEs in developing countries.

This follow-up is to help obtain a little deeper information and insight beyond your responses.

Digital transformation involves the introduction and use of digital technologies (Information Technology related Technologies) to enhance and transform businesses.

The research objectives are as follows:

- To explore the factors that drive digital transformation.
- To identify the processes of digital transformation.
- To evaluate the outcomes of digital transformation.
- To understand the SMEs managerial and organisational capabilities and capacities in digital transformation in developing countries.

Kindly respond to the questions as sincerely as possible to help achieve the purpose of the research, which would be a useful resource for SME businesses in the long run.

Be assured that the responses to the questions and the interview will remain confidential, and your identity will be anonymous.

PRELIMINARY QUESTIONS

Section A: Profile and demographics of Delphi panel / respondents.

I would need a few details about you as the respondent.

- i. Main Sector or Industry of Enterprise or Organisation.
- ii. Position and Speciality of Respondent in enterprise or organisation.
- iii. Responsibility of respondent in the enterprise of the organisation.
- iv. Age or age range:
- v. Qualification and Professional or Occupational background and experience.
- vi. Years of Experience.
- vii. How will you describe your enterprise or organisation regarding products/services, market and customers?

MAIN QUESTIONS

**Section B:** Digital Technologies for Digital Transformation of SMEs in Developing Countries.

1. In your opinion, what digital technology or technologies are SMEs using in developing countries? (The examples given below are to serve as a guide only).
  - a. Mobile computing (e.g., mobile apps, tablets, smartphones).
  - b. Cloud computing (e.g., Online Enterprise systems (ERP) such as Ecount ERP, Online data storage systems such as Google Drive, Dropbox etc., Online Office systems such as Office 365 etc.).
  - c. Big Data/Analytics (e.g., analysing/leveraging data, analytical systems or software for forecasting and predicting business trends and performance from data gathered).

- d. Social media /social networks (e.g., Facebook, Twitter etc., for marketing and contact with customers).
  - e. E-commerce platforms (Tonaton, Jumia, Olx etc.).
  - f. Website (e.g., the business website for advertising or e-commerce).
  - g. The digitalisation of physical assets (e.g., asset tracking systems, asset scheduling systems, using embedded sensors in reactive, preventive and predictive maintenance of equipment).
  - h. Digital technology in production (e.g., 3D printing, Computerised Design Systems etc.).
  - i. Indicate any other digital technology, not mentioned above.
2. Explain how the digital technology (technologies) mentioned above is(are) used directly in business operations.

**Section C: Drivers of Digital transformation of SMEs in Developing Countries.**

3. Why do enterprises (SMEs) use digital technologies in developing countries?
4. Mention specific drivers for using digital technologies to transform SMEs in developing countries in relation to the following areas.
  - a. The digital technology itself.
  - b. The Organisation's Internal System, Culture, Tasks etc.
  - c. The Organisation's External Environment.
  - d. The Management of the enterprise.
  - e. The Customers, Market Pressure, and stakeholders.
  - f. The Employees of the enterprise.
  - g. The resources, capacities and capabilities of the enterprise.
  - h. The Government, Regulations, Laws.

- i. The Competition and the Industry.
5. What are the most significant changes related to digital transformation in SMEs?
6. What are the underlying factors that drive those changes?

**Section D: Processes and Stages of Digital Transformation of SMEs.**

7. What preparations are usually made by enterprises concerning digital transformation anticipation and implementation?).
8. What are the processes or activities that enterprises (SMEs) must go through to undertake or achieve digital transformation? (Arrange them in their order of occurrence).
9. Mention specific processes or activities in relation to each of the following:
  - a. The Adoption of Digital technologies.
  - b. The Digitalisation (implementation and use) of the technologies.
  - c. The enterprise's resources, capacities, capabilities and competencies (both human and material).
  - d. The strategic direction, orientation or adjustments.
10. Would the type of digital technology involved influence the processes? Why and how?
11. Would the type of organisation involved influence the processes? Why and how?
12. Would there still be some well-defined major stages of digital transformation, irrespective of, and corresponding to, the processes and or activities? In any case, what would be the major stages of digital transformation, in your opinion?

**Section E: Outcomes of Digital Transformation in SMEs of Developing Countries**

13. How do enterprises benefit from using digital technologies?

14. How is the success of digital transformation measured?
15. Any specific success or failure experiences regarding digital technology implementation, and what are the causes?
16. Which areas of enterprises are directly affected by digital transformation?
17. What factors directly affect the intention to use and use digital technologies within the digital transformation of enterprises?
18. How does digital transformation impact the following areas?
  - a. Human resource.
  - b. Material resource.
  - c. Organisational structure.

**Section F: SMEs Managerial and Organisational Capability and Capacity in Digital Transformation of SMEs in developing countries.**

19. What are the barriers and constraints encountered in implementing digital technologies in enterprises?
20. How have the barriers to implementing digital technologies impacted how the organisation works?
21. What are the SMEs managerial capabilities or capacities involved in the digital transformation?
22. What are the organisational capabilities or capacities involved in digital transformation?
23. How will your company adopt digital technologies in the future?
24. What are the precautions that will be considered?
25. Any other relevant comment?

**Section G:** Interacting effects of drivers, processes outcomes and capabilities and capacities of Digital Transformation of SMEs in developing countries.

26. Are there any influences of the drivers on the processes and the outcomes mentioned above? If so, how do the drivers affect the processes and the outcomes?
27. Are there any influences of the processes on the outcomes mentioned above? If so, how do the processes affect the outcomes?
28. Are there any influences of the managerial and organisational capacities and capabilities on the drivers, processes, and outcomes of digital transformation of SMEs in developing countries? If so, how do they affect them?

END OF QUESTIONS

Thank you



## Appendix 5

### Ethical Clearance Letter



# UNIVERSITY OF GHANA

ETHICS COMMITTEE FOR THE HUMANITIES (ECH)

*P.O. Box LG 74, Legon, Accra, Ghana*

My Ref. No...ECH 004/20-21 ...

September 14, 2020

Mr. Samuel Anim-Yeboah  
Department of Operations and  
Management Information  
Systems University of Ghana  
Legon

#### ETHICAL CLEARANCE (ECH 004/20-21)

The protocol title below has been reviewed and approved by the ECH Committee.

**TITLE OF PROTOCOL: CONCEPTUALIZING DIGITAL TRANSFORMATION OF SMES IN DEVELOPING COUNTRIES: THE DRIVERS, PROCESSES, IMPACT AND IMPLICATIONS**

**PRINCIPAL INVESTIGATOR: MR. SAMUEL ANIM-YEBOAH**

Please note that the final review report must be submitted to the Committee at the completion of the study. Your research records may be audited at any time during or after the implementation. Any modification of this research project must be submitted to ECH for review and approval prior to implementation.

Please report all serious adverse events related to this study to ECH within seven (7) days verbally and in writing within fourteen (14) days.

This certificate is valid till September 13, 2021. You are to submit annual reports for continuing review.

Please accept my

congratulations. Yours Sincerely,

Professor C. Charles Mate-Kole  
ECH Chair

Cc: Professor Richard Boateng, University of Ghana Business School, UG

## Appendix 6

### Joy Online Report on Workshop

The report by Joy Online on the workshop is available at

<https://www.myjoyonline.com/a-new-practice-based-framework-for-the-digital-transformation-of-businesses-developed-by-a-ghanaian-mis-consultant/?param=MjMzNTQ0OTU1MjAx>



Technology

## A new practice-based framework for the digital transformation of businesses, developed by a Ghanaian MIS Consultant

Source: Emmanuel Kwasi Debrah

27 May 2021, 12:35 pm

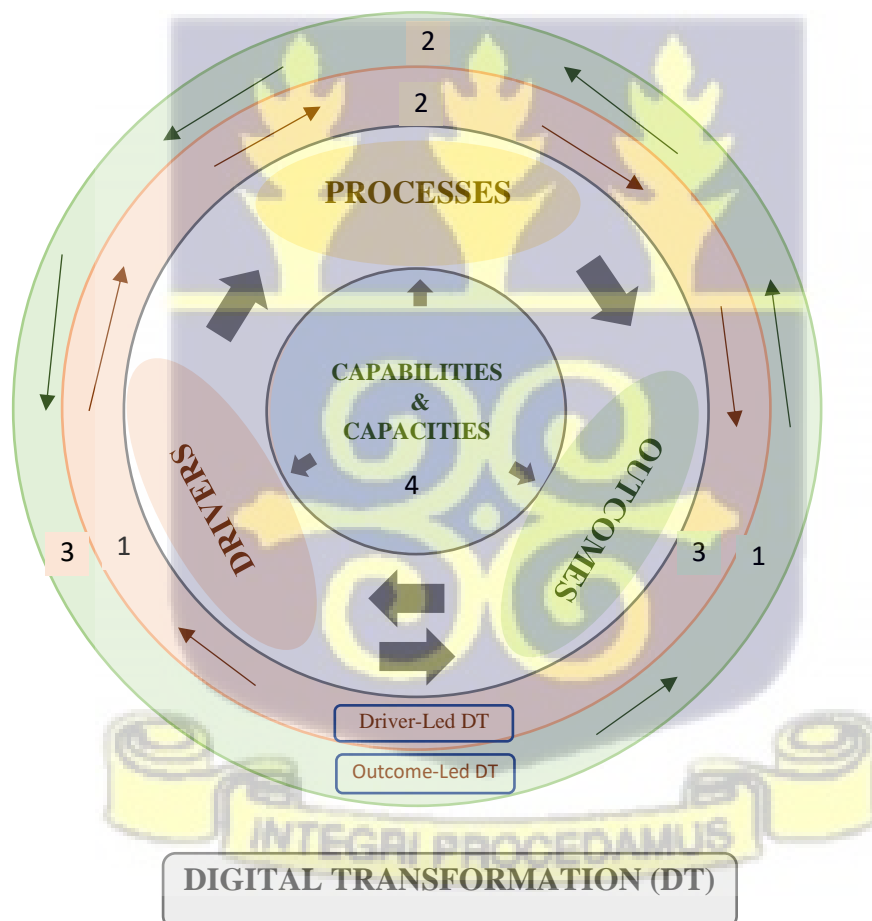


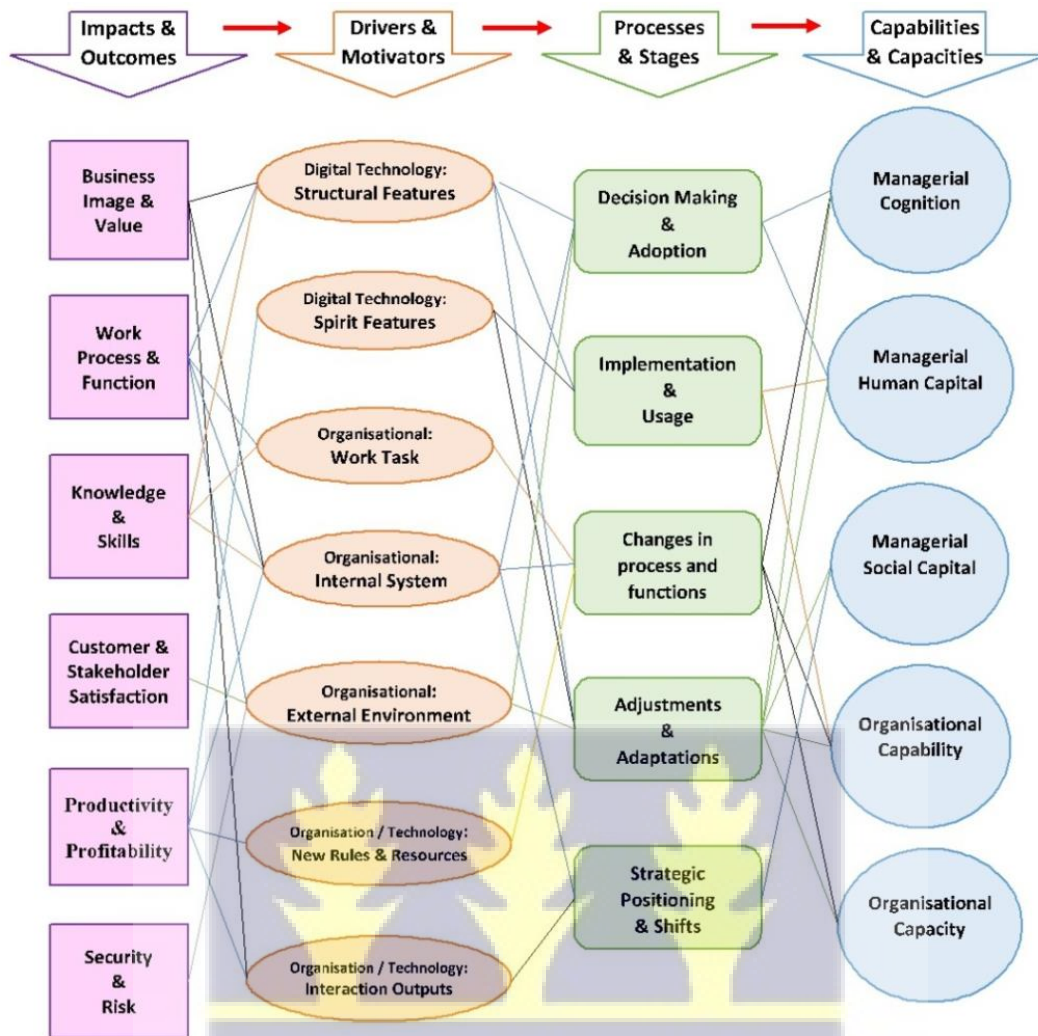
The dawn of Covid-19 has reaffirmed the need to use the digital space for effective business activities.

However, looking for suitable digital systems and getting the implementation done right can be a headache as the wrong tools can be highly a disservice.

Fortunately, a Ghanaian management information systems consultant, Samuel Anim-Yeboah, has developed a practitioner's framework to transform businesses digitally.

The Drivers-Processes-Outcomes-Capabilities/Capacities framework (DPOCC Framework) is designed to help with the digital transformation of organisations to achieve the desired outcomes.





A myriad of digital technologies is becoming readily available and affordable for use by organisations and businesses.

These technologies, including mobile computing, cloud computing, social media, e-commerce, and virtual tools, have been instrumental in transforming businesses.

The effects of covid-19 have compelled businesses to consider digital tools to allow for remote management.

However, an uninformed selection of software or digital tools and processes may be a liability.

As part of his PhD thesis in Information Systems at the University of Ghana, Mr Anim-Yeboah set out to design a model that helps transform organisations and businesses.

The DPOCC framework is designed for entrepreneurs, managers, and business practitioners to help in the digital transformation of organisations.

The DPOCC framework can help policymakers make and implement policies that would support the pursuit of drivers to achieve desired policy outcomes.

“The DPOCC framework will facilitate the pursuit of particular drivers, optimise particular processes, and consider capabilities to achieve the desired outcomes,” Mr Anim-Yeboah explained.

The mechanism of DPOCC has four main steps to follow:

First, the desired digital transformation outcomes are specified and clarified by management. Secondly, there is a focus on the corresponding drivers to pursue. Thirdly the respective processes are optimised, and lastly, the capabilities and capacities of the organisation are considered.

The Principle of the DPOCC framework is about how to achieve efficient and effective digital transformation. Already, three businesses have used this tool to transform digitally.

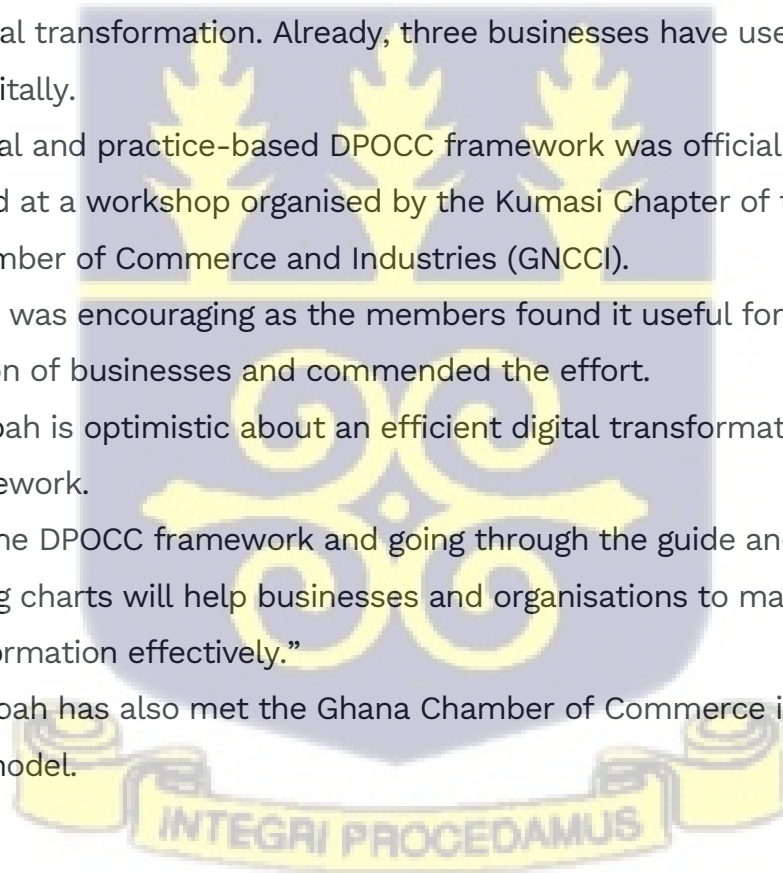
The theoretical and practice-based DPOCC framework was officially presented and discussed at a workshop organised by the Kumasi Chapter of the Ghana National Chamber of Commerce and Industries (GNCCI).

The feedback was encouraging as the members found it useful for the digital transformation of businesses and commended the effort.

Mr Anim Yeboah is optimistic about an efficient digital transformation with the DPOCC Framework.

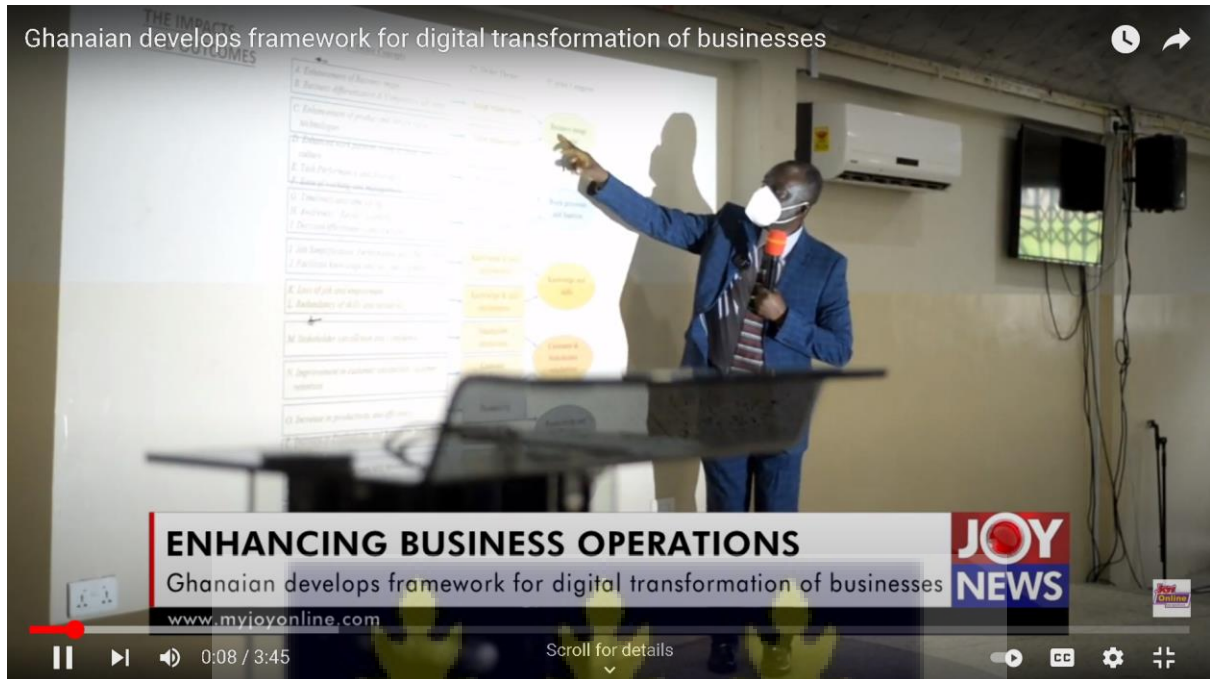
“By utilising the DPOCC framework and going through the guide and accompanying charts will help businesses and organisations to manage their digital transformation effectively.”

Mr. Anim Yeboah has also met the Ghana Chamber of Commerce in Kumasi to discuss the model.



Video of the News Item

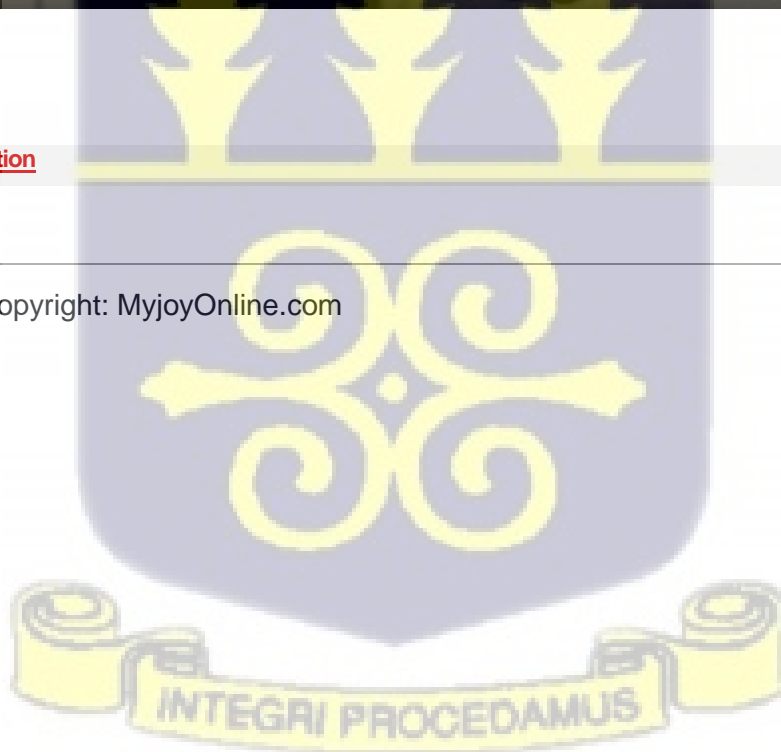
<https://youtu.be/zVvFkP4rTPQ>



Tags:

[Digital Transformation](#)

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## Appendix 7

### Citi Newsroom Report on Workshop

The report by Citi Newsroom on the workshop is available at <https://citinewsroom.com/2021/06/ghanaian-develops-digital-transformation-framework-for-business-owners/>

Sunday, June 6, 2021



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# Ghanaian develops digital transformation framework for business owners

By [Edward Opong Marfo](#)

[June 1, 2021](#)



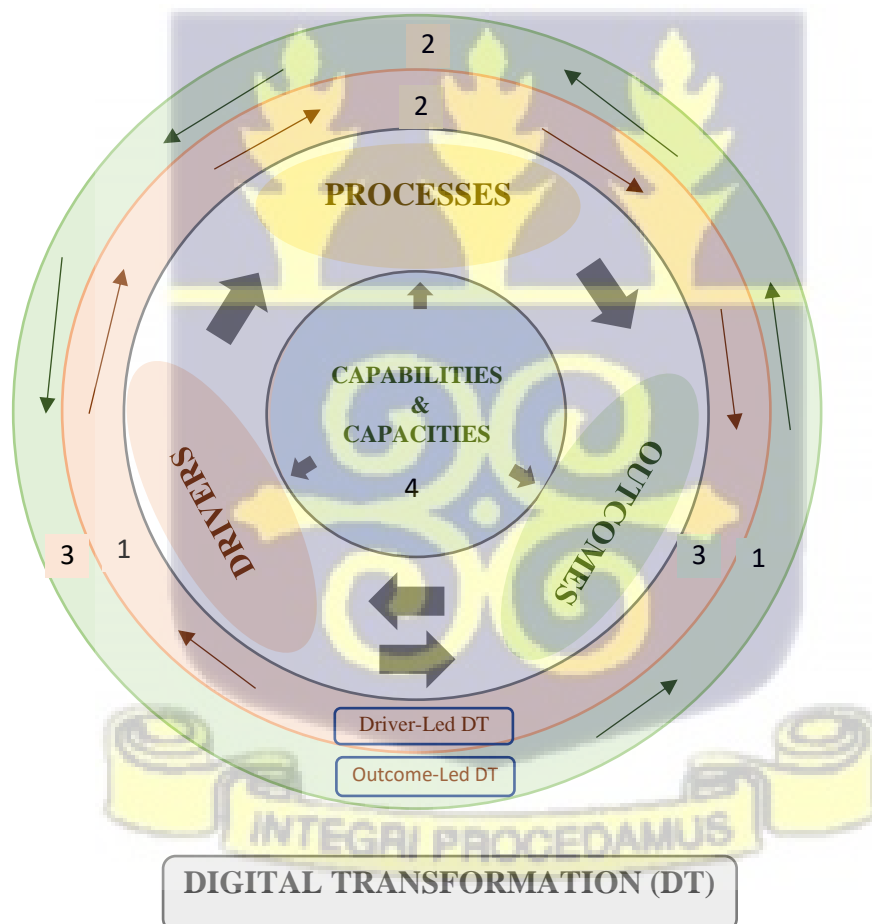
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In the wake of the coronavirus pandemic, various businesses have been finding ways of adopting the use of affordable modern technologies in ensuring business growth.

However, having access to the right systems or approaches to spur business growth appears to be a challenge for many large, small, and medium-scale businesses in Ghana.

In a bid to address this, a Management Information Systems consultant, Samuel Anim-Yeboah, has created a digital framework for businesses that makes it easier to effectively achieve the intended outcomes of a business.

As part of his Ph.D. thesis, Samuel Anim-Yeboah has designed the Drivers-Processes-Outcomes Capabilities and Capacities Framework (DPOCC-Framework), which he believes is the missing link for Ghanaian businesses, especially those seeking to achieve digital transformation for their businesses.



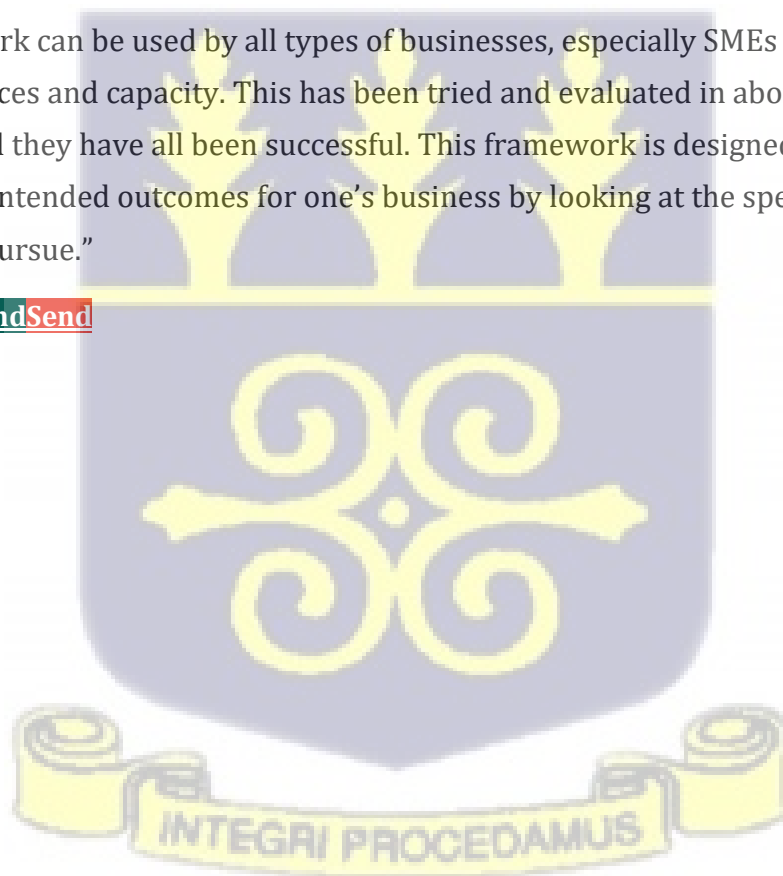
Speaking to some members of the business community in Kumasi, he explained that the digital framework considers factors that help businesses achieve their intended outcomes.

“This framework guides you to achieve your intended and desired outcomes for your business by helping you to look at the specific drivers or the specific motivation that you need to pursue. Also, if one is pursuing these motivations, what corresponding processes should be optimised or emphasised to ensure one can achieve those objectives? Within those processes, the questions to consider are: what competencies are needed, and which ones are available? What resources are needed, and which ones are available or not available?”

He explains that the framework has worked perfectly for some companies and is thus urging other business owners to take advantage of it.

“This framework can be used by all types of businesses, especially SMEs who lack the needed resources and capacity. This has been tried and evaluated in about three companies and they have all been successful. This framework is designed to help one achieve one’s intended outcomes for one’s business by looking at the specific motivators one needs to pursue.”

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## Appendix 8

### List of Publications

#### PUBLICATIONS ASSOCIATED WITH THE THESIS

2 Journal Articles, 3 Book Chapters and 2 Conference Papers.

Publication Type	No.	Full Bibliographic Information
Journal Article	1	Preko, M., <b>Anim-Yeboah, S.</b> , & Odame, F. (2021). Doctorpreneurship in the Digital Age: Perspectives from Ghana's Health Sector. <i>International Journal of E-Entrepreneurship and Innovation (IJEI)</i> , 12(2).
	2	<b>Anim-Yeboah, S.</b> , Boateng, R., Odoom, R. & Kolog, E. A. (2020). Digital Transformation Process and the Capabilities and capacities' influence on Small and Medium Enterprises. <i>International Journal of E-Entrepreneurship and Innovation (IJEI)</i> , 10(2), 26-44.
Book Chapter	3	<b>Anim-Yeboah, S.</b> , Apau, R., & Preko, M. (2022). Drones in the Digital Transformation of Healthcare Delivery in Africa. In <i>Digital Innovations, Business and Society in Africa</i> (pp. 31-56). Springer, Cham.
	4	Preko, M., Shabaya, P., & <b>Anim-Yeboah, S.</b> (2022). Dealing with the Unexpected: Exploring the Unintended Negative Consequences of Digitalisation in Africa's Healthcare Industry. In <i>Digital Innovations, Business and Society in Africa</i> (pp. 115-136). Springer, Cham.
	5	<b>Anim-Yeboah, S.</b> (2020). Organisational Transformation in Developing Economies by New and Emerging Information Systems: The Usage, Transformations, Outcomes, Benefits, and Management. In <i>Handbook of Research on Managing Information Systems in Developing Economies</i> (pp. 178-208). IGI Global.

<b>Conference Paper</b>	<b>6</b>	<b>Anim-Yeboah, S.,</b> Boateng, R., Awuni Kolog, E., Owusu, A., & Bedi, I. (2020, April). Digital entrepreneurship in business enterprises: A systematic review. In Conference on e-Business, e-Services, and e-Society (pp. 192-203). Springer, Cham.
	<b>7</b>	<b>Anim-Yeboah, S.,</b> Boateng, R., & Kolog, E. A. (2019). Adoption of Mobile Pedigree as an Anticounterfeiting Technology for Pharmaceuticals in Developing Countries. <i>In Proceedings of 25<sup>th</sup> Americas Conference on Information Systems. AMCIS 2019, Cancun, Mexico.</i>

