Gordon Institute of Business Science
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The relationship between digital transformation and strategic agility

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ABSTRACT

A fundamental change in the way economic life is experienced and managed is underway. This paradigm shift is being driven by the emergence of a general-purpose technology platform upon which new business value chains and ecosystems are being built. Digital transformation, the conduit to accessing this new-age infrastructure, has significant implications for organisations' corporate strategic evolution in response to environmental stimuli, with strategic agility playing an increasingly central role in business survival. The importance of digital transformation as an enabler of strategic agility has garnered both advocates and detractors in academia and business; some studies argue that digital transformation is the cornerstone of strategic agility, while others refute this stance. Based on this incongruity, the purpose of this research was to examine the relationship between digital transformation and strategic agility. The relationship between strategic agility and the elements of scale of digital transformation, scope of digital transformation and speed of digital transformation was assessed. Primary data from management level individuals across small, medium and large South African businesses was collected, prepared and analysed to draw conclusions on the observed relationship between the constructs.

The study found that all three components of digital transformation have a significant positive relationship with strategic agility, and that collectively, they are significant predictors of organisations' strategic agility. The relative importance of the contribution of the three components of digital transformation to strategic agility was also revealed, with speed and scale having the highest and lowest impact respectively. It was concluded that organisations should approach digital transformation iteratively, leveraging this difference in terms of the relative contribution of its components to achieve control over the desired impact on their strategic agility in the most cost-effective manner possible.

KEYWORDS

Digital Transformation; Strategic Agility; Dynamic Capabilities

DECLARATION

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree or examination in any other University. I further declare that I have obtained the necessary authorisation and consent to carry out this research.

Gomotsegang Segaetsho

CONTENTS

ABSTRACT ..... **II**

KEYWORDS ..... **III**

DECLARATION ..... **IV**

CONTENTS ..... **V**

LIST OF FIGURES ..... **X**

LIST OF TABLES ..... **XI**

LIST OF ABBREVIATIONS ..... **XIV**

LIST OF SYMBOLS ..... **XVI**

1 DEFINITION OF RESEARCH PROBLEM **1**

1.1 Background **1**

1.2 Research problem **3**

1.3 Theoretical relevance of the research **3**

1.4 Business relevance of the research **3**

1.5 Scope of the research **4**

1.6 Research purpose **4**

1.7 Outline of the document **4**

2 THEORY AND LITERATURE REVIEW **5**

2.1 Introduction **5**

2.2 Strategy **5**

2.3 Strategic decisions and non-strategic decisions **6**

2.4 Strategic agility **8**

2.4.1 Theory of strategic agility 9

2.4.2 Dynamic Capabilities as a theoretic lens for strategic agility 10

2.5 Digital Transformation **13**

2.6 Digital transformation and strategy **15**

2.6.1 Scope of digital transformation 15

2.6.2 Scale of digital transformation 17
2.6.3 Speed of digital transformation 19
2.7 Debating digital transformation and strategic agility 20
2.8 Conclusion 22
3 RESEARCH HYPOTHESES 24
3.1 Hypothesis One 24
3.2 Hypothesis Two 25
3.3 Hypothesis Three 25
3.4 Hypothesis Four 26
4 RESEARCH METHODOLOGY AND DESIGN 28
4.1 Introduction 28
4.2 Choice of methodology 28
4.2.1 Research philosophy 28
4.2.2 Research approach 28
4.2.3 Research strategy 29
4.2.4 Data collection method 29
4.2.5 Research time horizon 30
4.3 Research design 30
4.4 Population 30
4.5 Unit of analysis 32
4.6 Sampling method and samples size 32
4.7 Measurement instrument 33
4.8 Questionnaire design 34
4.9 Questionnaire pre-testing process 35
4.9.1 Screening phase 35
4.9.2 Questionnaire piloting 36
4.10 Data gathering process 37
4.11 Data analysis approach 38
4.11.1 Data preparation 38

4.11.2 Imputation of missing data 39
4.11.3 Descriptive statistics 41
4.11.4 Normality of data 41
4.11.5 Outliers 42
4.11.6 Measuring the validity of constructs 43
4.11.7 Measuring the reliability of the instrument 45
4.11.8 Descriptive profile of factored constructs 47
4.12 Hypotheses testing 47
4.12.1 Assessing the relationships between the constructs 47
4.12.2 The multiple linear regression model of strategic agility and digital transformation 49
4.13 Limitations of the methodology 51
5 RESULTS 55
5.1 Introduction 55
5.2 Descriptive characterisation of the sample of data 55
5.2.1 Raw sample size 55
5.2.2 Response and completion rates 56
5.2.3 Missing data imputation and total data sample 56
5.2.4 Normality of data per survey question 57
5.2.5 Outliers 58
5.3 Descriptive statistics of the respondents 58
5.3.1 Age range 58
5.3.2 Tenure 59
5.3.3 Designation 60
5.3.4 Company size 60
5.3.5 Level of digital transformation 61
5.4 Internal reliability of constructs 62
5.5 Construct validity 62
5.5.1 Bivariate analysis of scale items 62

5.5.2 Exploratory factor analysis 62
5.5.3 Confirmatory factor analysis 64
5.6 Descriptive statistics of the factorised constructs 65
5.6.1 Data profile 65
5.6.2 Categorical variable constrained analysis 66
5.6.3 Post hoc analysis for levels of digital transformation 70
5.7 Assessment of research hypotheses 73
5.7.1 Correlation of research constructs 74
5.7.2 Hierarchical multiple regression of research constructs 76
6 ANALYSIS OF RESULTS 78
6.1 Introduction 78
6.2 Respondent participation 78
6.3 Seniority demographics 79
6.4 Tenure demographic 79
6.5 Company size demographic 80
6.6 DT level demographic 80
6.7 DT controlled post hoc analysis 81
6.7.1 Strategic agility 81
6.7.2 Scale of digital transformation 81
6.7.3 Scope of digital transformation 82
6.7.4 Speed of digital transformation 83
6.8 Testing of hypotheses 84
6.8.1 The relationship between the scope of digital transformation and strategic agility 85
6.8.2 The relationship between the scale of digital transformation and strategic agility 87
6.8.3 The relationship between the scale of digital transformation and strategic agility 88
6.8.4 The cumulative effects of digital transformation on strategic agility 89
7 CONCLUSION 93

7.1 Principal findings 93
7.2 Implications of the research for business 94
7.3 Implications of the findings for academia 96
7.4 Limitations of the research 98
7.5 Recommendations for further research 99
8 REFERENCES 101
9 APPENDICES 115
9.1 Questionnaire 115
9.2 Appendix B – Ethical Clearance 119
9.3 Appendix C – Data Preparation 120
9.3.1 Data collected 120
9.3.2 Normality 125
9.4 Appendix D – Data Analysis 140
9.4.1 Reliability 140
9.4.2 Exploratory Factor Analysis 141
9.4.3 Confirmatory Factor Analysis 149
9.4.4 Extracted factor descriptive statistics 153
9.4.5 Regression Analysis 153

LIST OF FIGURES

Figure 1: Theoretical model of the research study 23
Figure 2: Hypotheses model 27
Figure 3: Summary of research methodology 54
Figure 4: Distribution of respondents per age category 59
Figure 5: Distribution of respondents per tenure category 59
Figure 6: Distribution of respondents per management level category 60
Figure 7: Distribution of respondents per company size category 61
Figure 8: Distribution of respondents per DT level category 61
Figure 9: Partial plot of SA as a function of Scale of DT 82
Figure 10: Partial plot of SA as a function of Scope of DT 83
Figure 11: Partial plot of SA as a function of Speed of DT 84
Figure 12: Post hypothesis testing model 92
Figure 13: Iterative DT application model 95
Figure 14: Theoretical concept implied by the relationship between SA and DT 97
Figure 15: Histograms and Q-Q plots for questions 6 through 34 126
Figure 16: Variable scatter plot matrix 149
Figure 17: Digital scope CFA model 149
Figure 18: Digital scale CFA model 150
Figure 19: Digital speed CFA model 150
Figure 20: Strategic agility CFA model 150
Figure 21: Optimised first order factor CFA model 151
Figure 22: Homoscedasticity - dependent variable as a function of the standardised residuals 153
Figure 23: Partial plot of SA as a function of Speed of DT 156
Figure 24: Partial plot of SA as a function of Scope of DT 156
Figure 25: Partial plot of SA as a function of Scale of DT 157

LIST OF TABLES

Table 1: Summary of business size definitions (National Small Business Amendment Act of 2003) 31

Table 2: Data collection and imputation summary 57

Table 3: Summary of categorical variable controlled skewness 58

Table 4: Summary of internal consistency test 62

Table 5: Exploratory factor analysis summary 63

Table 6: Model fit indices 64

Table 7: Convergent and discriminant reliability indicators of the optimised first order factor model 65

Table 8: Descriptive statistics of extracted factors 65

Table 9: ANOVA of the various age ranges 66

Table 10: ANOVA of the various durations of tenure 67

Table 11: ANOVA of the levels of designation 68

Table 12: ANOVA based on company size 69

Table 13: ANOVA based on level of digital transformation in the organisation 70

Table 14: Descriptive statistics of each construct per level of DT 71

Table 15: Homogeneous subsets for strategic agility 72

Table 16: Homogeneous subsets for scope of digital transformation 72

Table 17: Homogeneous subsets for scale of digital transformation 73

Table 18: Homogeneous subsets for speed of digital transformation 73

Table 19: Bivariate correlation analysis of the scope of digital transformation and strategic agility 74

Table 20: Bivariate correlation analysis of the scale of digital transformation and strategic agility 75

Table 21: Bivariate correlation analysis of the speed of digital transformation and strategic agility 75

Table 22: Regression Model 1 summary 76

Table 23: Regression Model 2 summary 76

Table 24: Regression Model 3 summary 77

Table 25: Sample of raw data collected....120
Table 26: Sample of coded data....121
Table 27: Sample item code book....122
Table 28: Sample of data imputation....123
Table 29: Sample log of winsorised data points....124
Table 30: Shapiro-Wilk test output....125
Table 31: Data characteristics per question....134
Table 32: Skewness and Kurtosis for Age Range categorical variable....135
Table 33: Skewness and Kurtosis for Tenure categorical variable....136
Table 34: Skewness and Kurtosis for Designation categorical variable....137
Table 35: Skewness and Kurtosis for Company Size categorical variable....138
Table 36: Winsorised data characteristics per question....139
Table 37: Reliability of DT Scope scale....140
Table 38: Reliability of DT Scale scale....140
Table 39: Reliability of DT Speed scale....141
Table 40: Reliability of SA scale....141
Table 41: DT Scope correlation matrix....141
Table 42: DT Scope KMO and Bartlett's test....142
Table 43: DT Scope total variance explained....142
Table 44: DT Scale correlation matrix....143
Table 45: DT Scale KMO and Bartlett's test....144
Table 46: DT Scale total variance explained....144
Table 47: DT Speed correlation matrix....145
Table 48: DT Speed KMO and Bartlett's test....146
Table 49: DT Speed total variance explained....146
Table 50: SPD Component correlation matrix....146
Table 51: DT Speed factor loading....147
Table 52: SA correlation matrix....147
Table 53: SA KMO and Bartlett's test....147

Table 54: SA total variance explained 148
Table 55: Composite EFA factor loadings 148
Table 56: CFA late measured variable loading per construct.....152
Table 57: CFA construct correlation 152
Table 58: Extracted construct descriptive statistics.....153
Table 59: Stepwise regression model summary 154
Table 60: Stepwise regression model ANOVA 154
Table 61: Stepwise regression model coefficients 155

LIST OF ABBREVIATIONS

AVE	Average Variance Extracted
ANOVA	Analysis Of Variance
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CR	Composite Reliability
DBS	Digital Business Strategy
DC	Dynamic Capabilities
DT	Digital Transformation
EFA	Exploratory Factor Analysis
GFI	Goodness of Fit Index
HSD	Honest Significant Difference
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
MAR	Missing At Random
MCAR	Missing Completely at Random
MSV	Maximum Shared Variance
NMAR	Not Missing At Random
RMSEA	Root Mean Squared Error of Approximation
SA	Strategic Agility
SCL	Scale
SCP	Scope
SEM	Structural Equation Modelling
SPD	Speed
Q-Q	Quantile-Quantile
VS	Versus

WEF	World Economic Forum
ZAR	South African Rand

LIST OF SYMBOLS

%	Percentage
Δ	Delta (Change in Value)
β	Beta Coefficient
df	Degrees of Freedom
F	F –Test
M	Mean
N	Total Sample
t	T - Test
p	P – Value (Calculated Probability)
r	Pearson's Correlation Coefficient
r_s	Spearman's Rho
SD	Standard Deviation
Z	Standardised Deviations from the Mean

1 DEFINITION OF RESEARCH PROBLEM

1.1 Background

Changes in technology are driving transformation in the way that organisations conduct their business (Fichman, Dos Santos & Zheng, 2014). The complexity of business environments has altered the economic setting that enterprises are exposed to, and this has affected the evolution of organisations' corporate strategy in response to environmental stimuli as a matter of survival (Pagani, 2013). Some academics argue that the observed evolution of strategy is linked directly to digital technology's ascent from an information technology department discussion to an item on the agenda of an organisation's strategic decision-makers (Bharadwaj, el Sawy, Pavlou & Venkatraman, 2013).

Over the past 20 years, digital technology has outgrown its initial base of information technology to become a source of competitive advantage in the global business community (Matt, Hess & Benlian, 2015; WEF, 2017). Initially, due to the scarcity of digital technology, first movers were rewarded with perceived benefits that afforded them abundant measures of flexibility and set them apart from their competitors (Tallon & Pinsonneault, 2011; Pagan, 2013). In recent years, however, with the increased availability and subsequent lower cost of technology, the field of strategy has increasingly embraced earlier trains of thought which distinguished between, first, the flexibility introduced by digital technology, and second, adaptability as a core competence central to strategic agility (SA) (Teece, Peteraf & Leih, 2016).

Researchers have proposed different components of digital transformation (DT) and its effective areas in organisations, some more granular than others (Sebastian, Ross, Beath, Mocker, Moloney & Fonstad, 2017; Matt et al., 2015). Sebastian et al. (2017) and Matt et al. (2015) generally address the effect of DT on value proposition, value capture and organisational structure, among others. It is inferred from these researchers that there is a general understanding within the digital community that DT has been mapped to effects on organisations and their businesses.

Fitzgerald, Kruschwitz, Bonnet and Welch (2014) posed a contrarian view to the effect that the actual bankable benefits of DT have not been successfully quantified. They added that the urgency to implement DT, particularly in organisations with a legacy of success, does not reflect the significance placed upon the influence of DT on SA by the

digital community. Solis and Littleton (2017) added that the understanding of the adequacy of DT in organisations is stratified: higher-level employees who engage in matters of strategy find present states of DT adequate, while lower-level employees engaged in operational tasks find the levels of DT inadequate. Empirical evidence of this phenomenon is uncovered in Section 6 of this study.

Discussions in literature, particularly from proponents of digital technology, emphasize that digital technology has allowed what was previously overlooked as data noise to be appreciated as potential value-bearing information (Sharma, Mithas, & Kankanhalli, 2014). The relationship between DT and improved decision-making in digitally transformed organisations remains inconclusive (Lycett, 2014). This suggests that there is still a need to clarify whether the role of DT only improves the sensing component of strategy, or if it extends to the response function as well (Teece et al., 2016; Overby, Bharadwaj & Sambamurthy, 2006).

Previously, information technology and digital technology were perceived as components of the information technology functions within organisations. In the past two decades, what was known as digital technology has challenged that status and graduated towards strategic significance (Bharadwaj et al., 2013). The zone of overlap between DT and strategy has introduced the concept of digital business strategy (DBS), which proposes the formulation and execution of strategy through leveraging digital resources. Essentially, this advocates for the inseparability of strategy and digital technology in the digital age (Bharadwaj et al., 2013). Kane, Palmer, Phillips, Kiron and Buckley (2015) maintain the contrarian view that strategy remains to be considered independently, with technology only being introduced when necessary to serve strategic ends. The fact that DT is occurring despite the opposing views warrants critical investigation into the matter from a neutral base.

In summary, the subject background in this Section and in Section 2 points to SA as a core competence necessary for organisations to remain competitive and sustainable. Some literature attributes the achievement of agility to DT, while other literature refutes this premise, and further counters with arguments that the impact of DT has not been quantifiable on a strategic level. The state of affairs in business and academia concerning the relationship between the two constructs justifies a critical assessment of the actual influence of DT on SA.

1.2 Research problem

In a bid to remain competitive in the digital age, organisations are turning to DT to increase their ability to adapt and align their organisations with rapidly changing economic environments, otherwise known as SA. Uncertainty remains, however, as to the true influence of DT on this sought-after SA. This research, therefore, investigates the relationship between these two constructs.

1.3 Theoretical relevance of the research

The literature lays considerable stress on rapid economic change, and academia's emphasis has shifted from stability to agility as a core competence for survival and competitiveness (Teece et al., 2016). While some researchers (Tallon & Pinsonneault, 2011; Pagan, 2013; Bharadwaj et al., 2013) opine that there is a link between leveraging technology and flexibility (a tactical, short-term characteristic), others (Kane et al., 2015; Weber & Tarba, 2014) have adopted the stance that agility (a characteristic of long-term adaptability) is primarily a function of strategy and is not driven by DT. This research will therefore contribute to academic knowledge by critically assessing the actual relationship between elements of DT and SA and outlining which of them actually are significant predictors of SA. The theoretical relevance distilled from the research is further illuminated in Section 7.3.

1.4 Business relevance of the research

A key priority for business executives is to navigate rapidly changing globalized markets (Tallon & Pinsonneault, 2011) while maintaining their respective organisations' competitive advantage into the future. With digital technology advancing just as rapidly as the perceived changes in the state of the economy, businesses expect that the difficulties that they face in aligning their organisations with the kinetic economy will be resolved through DT (Kane et al., 2015). Through testing the correlation of the elements of DT and SA and then establishing the significance of the relationships between them, business leaders will be made aware of whether or not DT actually influences SA at all, and if so, to what extent. Once the significance of the relationships is established, business leaders will have an improved appreciation of the points of leverage towards improving SA, including the areas on which to focus their DT for the most impact on agility given the cost of procuring digital technology. Relevance of the research to business is elucidated in Section 7.2.

1.5 Scope of the research

The scope of the research will be limited to legitimately registered small, medium and large (as per the National Small Business Amendment Act of 2003, 2003) companies that operate in South Africa. Due to the commonality of the constructs to all companies, the study will not be limited to specific industries.

1.6 Research purpose

The objective of the research will be to establish the extent to which DT, through its various components (of digital transformation scope, digital transformation scale and digital transformation speed), influences strategic agility in organisations. This will be achieved through:

- Assessing the individual relationships between the various DT components and SA.
- Assessing the order of importance of the significant components of DT on SA.
- Assessing the cumulative effect of significant components of DT on SA.

1.7 Outline of the document

Section 1 is an introduction to the background of the study. It comprises a definition of the research problem as well as a demonstration of the purpose of the study. Section 2 provides the literature base of the research. Section 3 presents the hypotheses formulated from literature for testing. Section 4 expands on the proposed research methodology and research design. Section 5 and 6 comprise the results and subsequent analysis respectively, while Section 7 highlights closing arguments and the conclusion of the research. Section 8 presents the list of references, and Section 9 contains the appendices comprising the data collection tool and other supporting data referred to in various Sections of the study.

The following section introduces the literature that formed the foundation of the research. It provides an understanding of the constructs and theoretical lens through which they were considered. It also aggregates discussions and debates of various researchers which formed the basis of the research hypothesis presented in Section 3.

2 THEORY AND LITERATURE REVIEW

2.1 Introduction

This section presents the literature review that was conducted to provide insight into the various aspects considered in investigating the relationship between DT and SA. First, the core concept of strategy is delineated to gain clarity on the foundation of the subject as well as its relevance and bearing on business. This is supported by distinguishing between strategic and non-strategic decisions in order to elucidate the types of decisions concerned with the long-term impact of strategy.

Second, a review of the concept of SA considers various vantage points on the subject, expanding the definition to its internal and external implications on organisations. This is supplemented by an examination of SA as an academic theory, and as a preface to the introduction and discussion of the theory of Dynamic Capabilities.

Thirdly, a review of DT provides insight from literature on the subject, including various definitions and discussions on its documented interaction with business. This leads to a discussion of the overlap of DT and strategy, from which the central first-order components of scale, scope and speed are gleaned.

Finally, the literature review closes with a critical debate of the various elements surrounding the constructs of DT and SA. Herein, the arguments presented highlight the incongruence between academic and business positions on the various markers of the relationship between SA and DT. It is in this fertile soil that the relevance of this research (as denoted in Sections 1.3 and 1.4) is rooted and from which the hypotheses presented in Section 3 were extracted.

2.2 Strategy

The formal study of the discipline of strategy can be traced back to the publications of Game Theory experts (Shivakumar, 2014) such as Von Neumann and Morgenstern (1953). In their view, strategy was considered as a generic method or policy which guided the organisation in dealing with the dynamic circumstances it faced. Viewing strategy as a metaphor for policy implies that game theorists' perspective of the influence of strategy included all stakeholders in the environment of a company's business. Arguably, then, an inferable attribute of strategy is that, when executed, it must have implications for all participants in the area of business in which an organisation has chosen to operate.

Another concept that is key in moulding an understanding of the nature of strategy is embodied in Drucker's statement that it is "making what is desirable first possible and then actual" (Shivakumar, 2014). This implies that the importance of strategy lies in the ability to distil a long-term vision for a business from an abundance of noise and innumerable possibilities. Decoding this vision into a series of working plans and goals then allows the organisation to be guided towards the realisation of the intended vision.

Recognition of the association of strategy with long-term vision suggests that matters of strategy are synonymous with deliberation and decision making in a realm of limited information. This makes strategy a low-precision exercise because its formative elements are forever in motion. Furthermore, the decisions referred to concern elements external to the organisation in question and are, therefore, materially beyond its control.

While much of strategy is viewed as an interpretation of a business organisation's operating environment, a contending view is that strategy is more related to its internal mechanics. Porter (1996) argued that the strategy of a business is a characteristic of how well its functional activities come together to enable it to deliver distinct value to its targeted customers. Given this argument, the coherence and efficacy of the stated selection of activities performed by the organisation in question then denote its strategy. Because a firm's activities compete for finite resources, it can be inferred that this perspective on strategy recognises the significance of trade-offs and incompatibilities between internal activities.

What can be gathered as a sum product of the perspectives discussed on the delineation of strategy is the insight that strategy comprises three successive elements. The first element implied by strategy is the ability to diagnose the external environment and associated trends. The second implied element is the establishment of a desired state or vision, coupled with its translation into an internally interpretable guiding policy that serves the critical function of aligning the organisation with the external environment. The third implied element that rounds off the strategy is that an articulate set of decisions and actions drives the organisation from the perceived present state to the envisioned state.

2.3 Strategic decisions and non-strategic decisions

Decisions are classified as strategic when they have an impact on the overall bearing of the organisation as it navigates the business environment (Shivakumar, 2014; Eisenhardt & Zbaracki, 1992). This means that decisions of this nature have a long-term impact on the organisation and, as such, far-reaching consequences for its survivability into the future. Furthermore, strategic decisions have a significant impact across all

business functions and inform how each function needs to be aligned to meet the firm's strategic objectives (Shepherd & Rudd, 2014).

In business applications, strategic decisions are typically identifiable by the extent of commitment that they invoke in the organisation. An artefact of the commitment is a decision's ease of reversibility and the cost implications of effecting such a reversal (Shivakumar, 2014). This is particularly true in the case of a firm's commitment to resources specific to the firm in question. That is, when a firm makes a strategic decision that commits it to particular strategic resources, the value of such resources to that particular firm far supersedes the value that any other firm could derive from them. As a result, large penalties are associated with the reversal of commitments made in strategic decisions (Ghemawat & de Sol, 1998).

Another marker that identifies strategic decisions is their impact on an organisation's scope. This includes their shaping of its chosen markets, services and products (Shivakumar, 2014). In essence, these decisions will directly influence where the organisation chooses to do business, who its target market and partners will be, and how it will go about delivering value to its clients. To this end, a strategic decision must reflect aggregate inputs from a variety of functions that will be involved in its operationalisation. Furthermore, strategic decisions translate their impact on the outward scope of the business into an inwardly reflected guidance structure that informs the administration of activities required to deliver on the intended strategic objectives (Shirley, 1982).

While a multitude of decisions that are important for the sustainability of an organisation are made by senior management, these decisions frequently do not qualify as strategic. An example of one such decision that has become synonymous with the modern economic setting is the drive to invest in digital technology and DT. Despite the fact that pursuant firms in some cases have realised positive effects on their bottom lines, the decisions leading to such investments cannot be classified as strategic. Regardless of whether the decisions satisfy the condition of non-reversibility, and constitute significantly high costs (signifying commitment), they do not change the scope of the firm. Such decisions are termed tactical decisions.

The discussion on the anatomy of strategic decisions thus far has pointed to the fact that strategic decisions significantly influence both the commitment and the scope of an organisation. Tactical decisions, on the other hand, may command a high degree of commitment, but they do not change a firm's scope (Shivakumar, 2014). They are decisions taken within the confines of the superseding strategic decisions. Although various tactical decision outcomes may be arrived at, the problems that warrant tactical

decisions are always derivatives of strategic decisions and thus traceable to strategic objectives (Shivakumar, 2014).

Building on the notion of tactical decisions, decisions that do not alter an organisation's scope or commitment level are classified as operational decisions (Shivakumar, 2014). These types of decisions are primarily concerned with the firm's day-to-day activities. At this level of decision making, problems, problem-solving methods and solutions are clearly identifiable – making operational decisions functions of efficient delivery.

2.4 Strategic agility

The early seminal work of Nobel Economist Stigler (1939) characterised agility in terms of flexibility and adaptability. The former is a short-term function concerned with the management of uncertainties associated with demand (ie. tactical), while the latter is an overarching long-term fundamental characteristic of an organisation that takes precedence over flexibility.

Adaptability is a strategic core competence that allows for alignment with a range of environmental stimuli, while flexibility is a function of technology available to meet a particular end. Sorenson (2003) embraced a similar definition as Stigler (1939), adding the enhanced ability of agile or adaptable firms to make incremental changes to maintain performance.

Following a meta-analysis of 195 peer-reviewed academic publications, Conboy (2009) defined agility as "the continual readiness… to rapidly or inherently create change, proactively or reactively embrace change, and learn from change, through its collective components and relationships with its environment" (p. 338). This definition highlighted that in addition to the internal moving parts that make an organisation agile, there is an external environment consideration that is equally important.

Harraf, Wanasika, Tate and Talbot (2015) defined agility as a measure of responsiveness to external stimuli. Adding to the foundation of Stigler (1939), they fragment agility into base components of flexibility and adaptability. They highlight the fact that flexibility is the ability to anticipate responses to external stimuli, while adaptability involves the actual decisions and actioned responses to external stimuli.

In more contemporary literature, Teece et al. (2016) defined agility as the "capacity of an organization to efficiently and effectively redeploy or redirect its resources to value creating and value protecting (and capturing) higher-yield activities as internal and external circumstances warrant" (p. 17). From this it can be inferred that agile capacity

is an inexhaustible resource. The caveat to the attainment of this resource, however, is the cost implications stemming from its being as unique to a firm as the core competencies that confer competitive advantage to the firm concerned. This means that it will sometimes be redundant as it is maintained in anticipation of the need to tap into it in response to commanding stimuli. For purposes of this study, Teece et al.'s (2016) definition of strategic agility will be adopted. It most adequately captures the essence of what is under investigation, namely, whether there is a relationship between an organisation's DT and its capacity to redeploy its resources in response to environmental changes (SA).

2.4.1 Theory of strategic agility

Despite being a subject of discourse (Gligor, Holcomb, Theodore & Stank, 2013) in business and management literature, SA has advanced to the fore as an alternative to earlier theories of strategy (such as industry forces, strategic planning, the resource-based view and sustainable advantage) which have been increasingly disqualified for being too linear (Weber & Tarba, 2014). Earlier notions of planned strategy, such as those alluded to above, were suitable in the tamer environments of the past; the complexities of contemporary business environments require agile strategic ability due to the ever-increasing pace of economic change and the vigour of turbulence in the economic environment (Neugebauer, Figge & Hahn, 2016).

Harraf et al. (2015) propose that several pillars are necessary for the attainment of SA. The first pillar is a culture of innovation, characterised by an organisation that perpetually seeks out opportunities and ways of improving the delivery of value to its clients. To that end, an organisation that embraces a culture of innovation tacitly heeds signals of changes in its operating environment as triggers informing the need for internal alterations geared towards strategic alignment. This opportunity-seeking attribute of an organisation that supports a culture of innovation is in parallel with Miles and Snow's prospector strategy as it presents innovation as a means of coping with rapidly changing business environments (Miles, Snow, Meyer & Coleman, 1978).

The second pillar of interest that is paramount for the attainment of SA is a tolerance for ambiguity (Harraf et al., 2015). Similar to innovation, this pillar is an artefact of an organisation's culture. In the modern economy, where digitisation has accelerated the rate of global changes in business, the ability to make decisions in a state of ambiguity is a key attribute of agile companies. The importance of this is underscored by the fact that in today's markets, competitors tend to have access to the same sources of

abundant and sometimes unstructured information. Strategic advantage, therefore, lies with firms that can distil valuable data from ambiguous information.

One of the central ideas in the discussion of SA is change management (Harraf et al., 2015). This is the third pillar of SA relevant to this research. Williams, Worley and Lawler (2013) emphasise that the dynamism and complexity of the contemporary business environment demands that organisations be adept at managing the change that occurs not only within their organisations but outside their radii of control as well. This points to change remaining a continuous phenomenon. The ability to align the strategic bearing of the organisation with the trend of change is therefore a key tenet of SA.

Harraf et al. (2015) proposed another pillar of interest, that of market analysis and response, comprising the measurement of the external environment and subsequent reaction based on that response. This attribute of SA was in line with the notion of "gathering and integrating knowledge" (Ivory & Brooks, 2018, p. 351) from the environment and "sensing the environment" (Overby et al., 2006, p. 121). These perspectives converge towards the theory of dynamic capabilities which will be discussed in detail in the following Section. As an added perspective, this pillar is extended to include SA's dependence on relationships between companies operating in a common industry. While competition may have been perceived previously as an "either / or facet" of business, the evolution of the way in which organisations interact in markets, balancing cooperation and competitiveness, supports SA and therefore the sustained success of interacting entities (Peng, Pike, Yang & Roos, 2012).

2.4.2 Dynamic Capabilities as a theoretic lens for strategic agility

Traditionally, business was dominated by conventional "resource-based strategy" in which success was tilted towards organisations that were first movers towards the rapid accumulation of advantaging resources (Teece & Pisano, 1994). As it focuses on the internal organisation of firms, maintenance of the competitive advantage gained from possession of the resources, once acquired or developed, is cemented by ring-fencing them with aggressive moats comprised of layers of intellectual property legalities to protect them from the incumbents' competitors (Eisenhardt & Martin, 2000).

The modern ubiquity of technology has brought with it regimes of fast-changing business environments which deflate the resource-based view (Eisenhardt & Martin, 2000). While various works in strategic theory have provided effective direction regarding the defence of the competitive advantage that an organisation may possess, they were not sufficiently geared towards an understanding of how to repetitively gain and maintain competitive

advantage in the new age of short-lived durations of business environment cycles (Teece, Pisano & Shuen, 1997). In essence, traditional theories of modern strategy were not equipped to address the key element of an ever-changing economic environment and its implications on the core capabilities of an organisation.

Winners, assert Teece & Pisano (1994), are organisations that can respond to changes in the business environment rapidly and effectively, reconfiguring their competences and value-delivery mechanisms for competitive advantage – they are strategically agile. Organisations that demonstrate the aforementioned attributes are said to possess DC (dynamic capabilities). The term "dynamic" intentionally emphasises the fluid nature of the interface between the environment, characterised by fast-paced changes in technology and global competition, and the modern firm; "capabilities" brings focus to the function of strategic management in re-configuring or even re-tooling the firm into congruence with the environment (Teece & Pisano, 1994).

DC is thought of as a composite of three core elements: sensing opportunities and threats in the environment, seizing opportunities and value capture through mobilisation of resources, and transforming or shifting of the organisation into alignment with environment (Teece et al., 2016; Pavlou & El Sawy, 2011). These components are considered to be artefacts which represent the state of agility of organisations in this research. Further, DC is understood to be independent of the methods of strategy formulation observed by firms; however, the strategies that emerge are expected to reflect the inclusion of DC.

Operationalising strategic agility through sensing, seizing and transforming

In markets characterised by fast change and turbulence, the ability to sense the environment is imperative to forming strategic opinions about a firm's direction. As this sensing ability precedes any responsive action that can be taken towards a strategic business need, it plays a crucial role in alerting the organisation to threats and opportunities in the environment before they become material, and especially before they are realised by the concerned organisation's competitors (Helfat & Peteraf, 2015).

Sensing relates to the abductive assimilation of all available data, which is followed by the formulation of hypotheses about the strategic implications of emerging data patterns for the interests of the business (Teece et al., 2016). This is of interest to this study as the engagement of digital technology has become central to the timely facilitation of abductive processes in modern business. Following from this is the inference that firms that can rapidly sense and identify structures within their operating environment are equipped with a key quality of strategic agility.

While sensing is an important foundation for the effectuation of agility through DC, seizing opportunity plays an equally important role. This attribute is concerned with the implementation of the logistical plan that follows the strategic opinion formed on the basis of sensed inputs (Teece et al., 2016). While several approaches exist through which seizing can be carried out, one method has stood the test of time from the Ford Motor company factories of the 1920s to the present-day-manufacturing facilities of Apple technology, is flexibility. The building of adequate flexibility into an organisation's functions and position in the business ecosystem allows for agile manoeuvrability. With reference to this research, the challenge that develops with the increased dynamism and velocity of markets is the increased complexity of systems, which understandably interferes with the ability to identify opportunities for building effective "slack" into an organisation (Eisenhardt & Martin, 2000; Teece et al., 2016). While building flexibility into organisations in the traditional resource sense is expensive, what is important to this research is the insulation that can be provided or enabled in the same fundamental way by digital technology.

The third component of the effectuation of agility through DC, transforming, is concerned with an organisation's ability to learn adaptively and execute strategic objectives incrementally and iteratively (Teece et al., 2016; Daniel & Wilson, 2003). This is consistent with the lean start-up methodology which advocates for learning quickly and adjusting efforts appropriately to enable the achievement of the end goal (Blank, 2013). Taken together, seizing and transforming make up the response function of DC through the mobilization of resources and adaptation in response to environmental stimuli. Previously, irreversibility posed significant costs to businesses that sought to make changes to elements of their value delivery to clients (Teece et al., 2016). The era of digital technology has, however, enabled rapid feedback and learning to occur in tandem with execution thereby providing a cost-effective means of effecting transformation.

As previously mentioned, DC has come to represent the evolution of strategic theory beyond the mature resource-based view. Due its relative nascence, much like DT, DC literature is inundated with theoretical and conceptual debates (Breznik & Lahovnik, 2014). While there are strong advocates for DC, there is an equally active opposition. Williamson (1999) described DC as ambiguous and lacking causal rigour, while Simonin (1999) alluded to DC being indistinct as a concept and lacking clarity.

Later still, Priem and Butler (2001) condemned DC for being tautological. Winter (2003) contends that DC, as a proposed set of higher-order capabilities, does not detract from the fact that effecting change is a function of ad hoc problem solving, a concept that is

not new to the field of strategy. Zahra, Sapienza and Davidsson (2006) criticized DC for being littered with inconsistencies in the application of the concept in the real world. They added that what is posited as DC is never pre-conceived and designed into effect but rather observed as a consequence of actions that may have been taken without awareness of the concept. Furthermore, Arend and Bromiley (2009) argued that DC in its present state lacks coherence as a model and theory of strategy. This argument effectively renders DC campaigns irrelevant in the realm of academic and strategic practice.

Despite the contention around the perceived merits and flaws of DC theory, the position taken by Teece and Pisano (1994) and Teece et al. (1997, 2016), summarised from the arguments above as strategic sensing and responding, affirmed the suitability of DC as a theoretical lens for this research. This conclusion is supported by the fact that this position appropriately captures the essence of the investigation of the relationship between DT and SA, namely an organisation's ability to alter its technological, strategic and operational stance in response to the perceived changes in the business environment within which it operates. Fundamentally, both constructs (DT and SA) of the research triangulate to various parts of DC, in turn strengthening its selection as the appropriate theoretical lens for the study.

2.5 Digital Transformation

In defining DT, Dehning, Richardson and Zmud (2003) state that DT must:

> fundamentally alter traditional ways of doing business by redefining business capabilities and/or (internal or external) business processes and relationships; it potentially involves strategic acquisitions to acquire new capabilities or to enter a new market space; it exemplifies the use of information technology (IT) to dramatically change how tasks are carried out… [it] is the move recognized as being important in enabling firm to operate in different markets, [and to] serve different customers… [it allows organisations to] gain considerable competitive advantage by doing things differently. (p. 654).

Rooted in the discipline of information systems, this definition touches on several elements that imply areas of common interest between DT and SA that were discussed in Section 2.4. Similar to the assertions of Bharadwaj et al. (2013), it highlights the evolution of IT from a function within the organisation to an important consideration in the strategic competitive advantage attainable by firms in the digital economy as expanded upon in Section 2.6.

Sebastian et al. (2017) describe DT as the engagement of “powerful, readily accessible technologies… intent on delivering unique, integrated business capabilities in ways that are responsive to constantly changing market conditions” (p. 198). Complementary to the definition by Dehning et al. (2003), this definition draws focus to the role of digital technology in cultivating adaptive capabilities that allow organisations to be agile in their responses to changes in their operating environments.

According to Liu, Chen and Chou (2011), DT is a process that occurs under the ambit of organisational transformation: the primary objective is change in key business domains such as structure and strategy within a designated period of time. The result of the organisational transformation that they envision is the birthing of new values and norms that drive a new approach to the organisation’s delivery of value to its clients. DT is therefore regarded as one of the organisational transformation domains that serve to integrate technology into the envisaged structure and operational processes emanating from the transformation process. While this view supports the previously cited authors’ stance that DT is a means to an end, Liu et al. (2011) emphasise organisational transformation as the end in question as opposed to the acquiring of capabilities that serve to enhance the organisation’s ability to navigate the business environment.

Berman (2012) defines DT as the pursuit of a co-dependent pair of complementary activities. The first element is the reshaping of an organisation’s value propositions; the second element is the transformation of operating models. While both components are important for the successful achievement of DT in an organisation, the industry and environment in which the firm conducts its business are key determinants of which the two elements will be the primary and secondary objectives in the transformation process. To illustrate the core differences between the two by way of example, companies that operate in industries such as financial services would benefit more from reshaping their value proposition by extending their existing offerings (which are already serviced through mobile and online devices) using digital technology. On the other hand, for companies operating in industries where customer connectedness does not form part of the value proposition, such as the mining and minerals sector, DT geared at the transformation of operating models is more beneficial as the primary objective.

This research will observe the definition of DT by Dehning et al. (2003), on the strength of its holistic approach. The author additionally notes that the definitions by Sebastian et al. (2017), Liu et al. (2011) and Berman (2012) are also relevant to the discussions in the research.

2.6 Digital transformation and strategy

In its earlier forms, technology IT remained a functional element subordinated to business strategy (Bharadwaj et al., 2013). Increasingly, digital technology has influenced the reshaping of traditional strategies (Sebastian et al., 2017; Mithas, Tafti & Mitchel, 2013; Bharadwaj et al., 2013). The adoption of digital technology enacts a process of transformation away from the traditional strategy, transcending all functional strategies of an organisation (Matt et al., 2015). This culminates in what Bharadwaj et al. (2013) define as a digital business strategy: “an organisational strategy formulated and executed levering digital resources to create differential value” (p. 472).

Leading from the discussion on the derivation of the DBS, Bharadwaj et al. (2013) identify three themes of a desired state of DBS achievable through digitally inclined transformation. These are scope of DT, scale of DT and speed of DT. In this context, scope relates to the business elements and products upon which DT will be effected; scale relates to how much of the elements or functions identified will be digitally transformed; and speed speaks to the pace of the enactment of DT and the associated impact on the organisation’s ability to deliver timely value.

2.6.1 Scope of digital transformation

Advances in information technology have prompted businesses to explore a wider variety of digital technology in pursuit of their promise of competitive advantage (Matt et al., 2015; WEF, 2017). If one realises that “competitive strategy under digital conditions raises the question of how business scope is impacted by digital technologies” (Bharadwaj et al., 2013, p. 473), then the importance of understanding how the scope of the DT embarked upon will serve the strategic aspirations of the organisation (prior to committing resources to the endeavour) becomes clear.

Sebastian et al. (2017) identified three key elements that are indicative of a broad scope of DT in an organisation. The first element is a strategic value proposition informed by multi-sided interaction-enabling technologies (eg. social, cloud, internet of things, mobile, and analytics). This element aligns the spread of DT across the organisation, creating superior customer engagement capability for the firm. By integrating the data from the multi-sided customer engagement channels with the existing value proposition base, the organisation can begin to develop learning capabilities that mature into an ability to anticipate customer needs effectively based on observed patterns of engagement.

The second key element is a robust operational backbone that fosters efficient and effective operational response to environmental stimuli (Sebastian et al., 2017; Krotov, Junglas & Steel, 2015). This operational backbone relates to the scalability of core operational competencies which extend to include "business capabilities that ensure the efficiency, scalability, reliability, quality and predictability of core operations" (Sebastian et al., 2017, p.201).

Digitisation of operational platforms across an organisation is the third key element (Sebastian et al., 2017). It serves to introduce speed and flexibility to the operational backbone which, in conventional business, may be built for reliability and stability at the expense of speed. DT that is correctly calibrated across the scope of a firm could provide fertile ground for proliferation of further relevant DT in parts of the organisation where it may not have been previously identified as necessary (Sebastian et al., 2017). This implies that digitised platforms create a foundation for organic innovation geared at improving the capabilities of a firm.

Matt et al. (2015), on the other hand, proposed an alternative composition of four dimensions that demonstrate DT scope. They argue that the first dimension, technology, reflects an organisation's awareness of new technology and how it could be of use in various areas of the business. The authors do not assign as much importance to the adoption of an identified technology as to understanding the balance between potential benefit to competitive advantage and the possible risks, which include limited availability of requisite skills for a particular technology.

The second dimension proposed by the authors relates to the changes that occur in the value chain as a result of the transformation of systems as a result of new technologies. Arguably, this dimension can be extended to include the way in which technology-driven changes affect resulting modes of value capture and value delivery. Careless transformation across a given scope in an organisation could result in unwanted changes to the firm's value chain, ultimately affecting clients' perception of a firm's value offering (Matt et al., 2015).

The next dimension is concerned with the structural changes that may be necessary to match the new digital activities within the organisation (Matt et al., 2015). As the structural elements of an organisation are fashioned around its value-creation processes (Cummings & Worley, 2014), DT across varying ranges of scope in the organisation may pose implications of misalignment within the corporate structure. It would therefore be prudent to approach the organisation as a system of interacting and compensating functions when considering the scope across which DT will be effected.

The final dimension proposed by the authors is the financial aspect. This is proposed as the engine that enables the enactment of the combination of the first three dimensions (Matt et al., 2015). Once DT has been effected, it serves as an indicator of the effectiveness of the first three dimensions. Prior to the execution of DT, this dimension serves as the most vital decision gate that determines the DT scope that the firm can afford to pursue. It is also the dimension that links the DT components of scale and speed to the component of scope.

2.6.2 Scale of digital transformation

While the scope of DT gives a sense of its diversity and spread across the functional and structural surface area of an organisation, the scale may be understood descriptively as the depth or size of the transformation engagement (Dewan, Michael & Min, 1998). The general notion of scale gained momentum with the inception of the Industrial Revolution, where increased scale was associated with the perception of lower unit costs and higher profitability (Bharadwaja et al., 2013). In the digital age, however, a higher scale of DT is not clearly linked to proportional benefits and may even be detrimental to an organisation's ability to account for the suitability of the scope of its DT (Dewan et al., 1998).

Tallon and Pinsonneault (2011) and Weill, Subramani and Broadbent (2002) state that over-indulgence in a large scale of DT may yield counter-intuitive outcomes such as strategic stagnation. They argue that once an organisation expends financial and human capital on DT, they may be overcome by a need to maximise the value they get out of their investment instead of changing the state of digital affairs based on strategic needs. This implies that despite the path that DT is charting in the digital economy, there is a human element at play that may cloud judgement on whether action or inaction with regard to engaging in DT is in the best interest of strategy. In contrast, Park, El Sawy and Fiss (2017) argue that scale of DT, as exemplified by large enterprise resource-planning systems, has a marked impact on SA. They attribute this impact to the ability of such transformation to change the way in which entire businesses operate. The two opposing views present respective merits that have become native to modern business. It is plausible to conceptualise that there may be contingencies that moderate the validity of the opposing sides based on the agile needs of the strategy.

Bharadwaj et al. (2013) advance a contemporary view of the concept of scale. They propose an alternative paradigm in which DT scale, in the digital age, is achievable

through elements such as dynamic scaling capabilities, network effects, information abundance and inter-organisational alliances.

In comparison to the link drawn by the previous authors between scale and size (or magnitude), the reconceptualization of scale as a dynamic capability equates it with an organisation's ability to dynamically inflate or deflate the scale of its digital resources as required to meet its agility needs without expending new capital to do so at each instance (Bharadwaj et al., 2013). This phenomenon describes a way in which the increase in value derived from the use of digitally transformed elements in an organisation is derived from an increase in frequency of use (Bharadwaj et al., 2013). Instead of pursuing the accumulation of DT in the form of multiple discreet components, focus would be drawn instead towards fewer DT components that can function at varying rates of productivity. Logically, this would reduce the need to build excessively costly redundancies into the transformation of systems.

In relation to the abundance of information, DT is charged with improving the ability of data assimilation. This implies emphasis on computational intelligence to filter through noise within data and discern what is worth investigating further, as opposed to concentration on the physical capacity to possess data (Bharadwaj et al., 2013). The ability to harness and make sense of quality data in the modern world is crucial as it defines the parameters of the reality that an organisation can or cannot perceive (Setia, Venkatesh & Joglekar, 2013). Higher information quality is therefore vital as an enabler of scale as it informs the effective combination of resources and processes in order to attain the varying scale requirements of a firm.

The achievement of scale through partnerships draws the final separation of scale from the customary physical or tangible form. Scale through partnerships highlights that in the digital age, organisations benefit from desisting from the DT of non-strategic aspects of their business and supplementing those needs through shared platforms and networks (Bharadwaj et al., 2013). The inference drawn from this is that DT resources could be more effectively focussed on core competencies and areas of the business where the highest impact or return would be achieved. In areas of business peripheral to the competitive advantage of the respective participating firms, sharing of platforms and resources affords them added returns in revenue and client service ability at a fraction of the cost.

2.6.3 Speed of digital transformation

The speed of DT is perhaps the best understood due to the evidence of its role as a driver of competitive advantage in industries, organisations and the lives of citizens of the digital economy (Fichman et al., 2014). Not only is the survival of organisations tested against their ability to navigate complex and uncertain economic settings, it is also tested against their ability to remain aware of the implications of the rate at which DT occurs and what that means for their strategic position (Pagani, 2013).

Drawing from Bharadwaj et al. (2013), speed of DT in the digital economy can be observed as being composed of several components, one of which is the speed of introduction of products to the market. Effective DT can therefore be considered in terms of its ability to "accelerate the speed of product launches" (Bharadwaj et al., 2013, p. 476) in line with the strategic mandate of a company. In a global business environment that is increasingly dominated by technology, it is reasonable to expect that firms lagging behind their digitally transformed peers will become increasingly disadvantaged as those that are digitally enabled will set and control the standard for the speed of strategic product launches. In so doing, they will remain competitively advantaged and agile in their responses towards environmental changes.

The second component of the speed of DT is the impact that it has on decision-making capability. The general consensus is that DT has sped up the decision-making capability of invested organisations (Bharadwaj et al., 2013). This has been primarily due to the enhanced assimilation and channelling speed of information across hierarchical layers and operational process flows. The importance of speed of DT in relation to the strategy of a firm is relative to the extent to which it enables the firm to deliver value or service to its clients (Setia et al., 2013). In particular, the enhancement of the firm's response capabilities to the needs of its clients forms a crucial part of its SA sense and response function. An added benefit to the enhancement of that capability is the insurance of the quality of the information delivered to the various decision-making nodes of the organisation.

Another pertinent component of the speed of DT is the speed of alliance formation. Network or alliance formation has gained traction as an enabler of strategy (Viswanathan, 2005). By conceptualising and structuring strategic networks, companies are able to gain access to capabilities that complement their core competencies (Bharadwaj et al., 2013). In this space, therefore, DT plays the role of affording organisations administrative command over their networks. With the capability of

network dynamism enabled through DT, organisations can rapidly align and realign the configuration of their networks to support the SA needs imposed by the environment.

Park et al. (2017) have an outward-in view of the speed of DT. They approach DT speed and its proposed enabling role in SA as a function of the rate of change and the unpredictability of the environment in which an organisation does business. As a result, it can be conceived that the speed of DT that an organisation commits to is commensurate with the rate of change that these two proposed dimensions (rate of change and unpredictability) of the environment cause within the organisation. This signifies a pull effect that the environment induces over the DT aspirations of an organisation, and the speed thereof. Consideration of this view of the speed of DT provides an appreciation of the fact that while there is a forward sequence of effects related to the speed of DT, as observed from a vantage point internal to the organisation (inside looking out), there is a reverse sequence at play that is effective from a vantage point in the environment (outside-looking-in). Whereas the inside-looking-out viewpoint allows the organisation to tally its capabilities during the DT process, the outside-looking-in perspective allows the organisation to calibrate its SA position relative to other sector and industry players (Park et al., 2017).

2.7 Debating digital transformation and strategic agility

Through the literature reviewed, it is apparent that the advent of a fast-changing business environment has necessitated the possession of agile faculties by organisations as a matter of sustainability. One way to attain any given desired agility is through digitally transforming organisations in a bid to increase their ability to sense and respond to threats and opportunities in their operating environments. Discussions on the union between technology and strategy (see for example Park et al. (2017) and Fitzgerald et al. (2014)) have shone light on the fact that while there is a growing trend of organisations turning to technology as a means of improving their DC, there is an equally healthy measure of concern as to whether the observed investment appetite for DT is commensurate with the desired outcome on SA. Given the nascent quality of DT and the rapid rate of change that the associated technology undergoes, the body of knowledge available on the subject of DT and its association with business is inconsistent and scattered at best (Bouwman, Nikou, Monlina-Castilo & de Reuver, 2018). These sentiments are shared by the researcher due to the fact that the inclination toward DT has been observed in South Africa as well. One such example has been the expenditure of ZAR 749 million on DT in one of Anglo American's commodity divisions between 2014 and 2017 in what was said to have been a strategic move (James, 2018).

Fitzgerald et al. (2014) added that complacency rooted in a history of success was a common inhibitor to the derivation of the intended value in 40% of the companies they surveyed. This implies that culture and legacy may be impediments to the successful delivery of superior DC in companies as intended. While matters of organisational culture constitute important strategic considerations, they were beyond the scope of this study. It is worth noting, however, that the author contemplated the possibility that if an organisation's culture does not follow through on its support of DT, the investment in its execution is unlikely to yield much strategic benefit.

Another consideration that could potentially influence the success and effectiveness of DT is the role and shared vision of leadership in driving the DT agenda (Fitzgerald et al., 2014; Long, 2011). Some research has highlighted that there were opposing views as to what comprises a state of successful DT in organisations: lower levels of staff express opinions that their firms have insufficient digital maturity, while the perception that the same firms are digitally mature increases with seniority (Solis & Littleton, 2017; Zain, Rose, Abdullah & Masrom, 2005). Although organisations' strategic trajectories are set by the highest levels of management, the daily execution of strategy rests with the lower tiers of management. A disjointed view on the adequacy of DT in an organisation could starve decision makers of vital inputs on the closing of transformation gaps that could improve their firms' SA.

Other management-related challenges that arise include innovation fatigue due the perception of constant change in favour of the latest fad (Fitzgerald et al., 2014), and the politics that centre authority on departments or individuals within organisations (Park et al., 2017; Panda & Rath, 2016). While these are not tangible, they are important elements to manage in order for DT to yield the desired impact on SA. Panda and Rath (2016) found that neglecting the managerial aspect of DT in favour of pursuing the technology aspect in isolation actually impeded SA as it did not improve organisational capabilities.

The DT process has enabled the assimilation of data previously relegated to the background of operational activity. Sharma et al. (2014) argue, however, that the abundance of data has not translated to an improved decision-making ability. Lycett (2013) agrees with Sharma et al. (2014) that DT has introduced a technology-driven sense-making ability, but the decision-making processes native to the collective, procedural and psychological frame of organisations remain unaltered. This suggests that despite the momentum of DT, "there is no one-to-one correspondence between an insight and a specific course of action to exploit that insight" (Sharma et al., 2014, p.

436). This creates a platform for further discussions and research into conceptualising a framework of the chronology of decision check-points that should follow DT-enabled environmental sensing and the subsequent decision-making structure.

In consideration of the agility of strategy on a global level, Setia et al. (2013) found that DT was a critical enabler of “glocalisation” for multinational companies. They describe glocalisation as the ability to adapt the value offerings of a business to the local preferences of nations and environments to which operations extend. With increased capabilities of sensing market indicators, firms are able to capitalise on opportunities to adapt their products or services rapidly to address end user needs. This constitutes SA related to market capitalisation. On the other hand, Lu and Ramamurthy (2011) found that while DT had a positive impact on other elements of SA, it did not assist companies to be agile in capitalising on market opportunities. These opposing views suggest that there are more latent aspects to be uncovered with regard to the relationship between DT and its effects in terms of SA on the ability of companies to capitalise on product or service markets.

2.8 Conclusion

The literature considered has provided background insight into the various aspects of DT and SA. Through critical examination of the concepts and arguments put forward in literature, the theoretical model in Figure 1 was constructed to serve as a diagrammatic representation of the elements in the relationship between DT and SA that the research seeks to understand. The exclusion of arrows on the DT side of the diagram reflects the research choice not to presuppose the direction of the relationship between the elements, given that there was evidence of arguments for and against specific directions of relationships between components of the two constructs. The findings of this research will be allowed to dictate the direction of the relationship empirically. The nesting of DC within the dashed vertical lines represents its adoption as the region of overlap between the constructs and its place as the theoretical lens of the study. SA is shown by the red oval, while the orange ovals represent the elements that operationalise DC for improved SA.

The following Section presents the hypotheses formulated for the study based on the literature reviewed in Section 2. It briefly introduces each of the hypotheses, citing relevant literature sources.

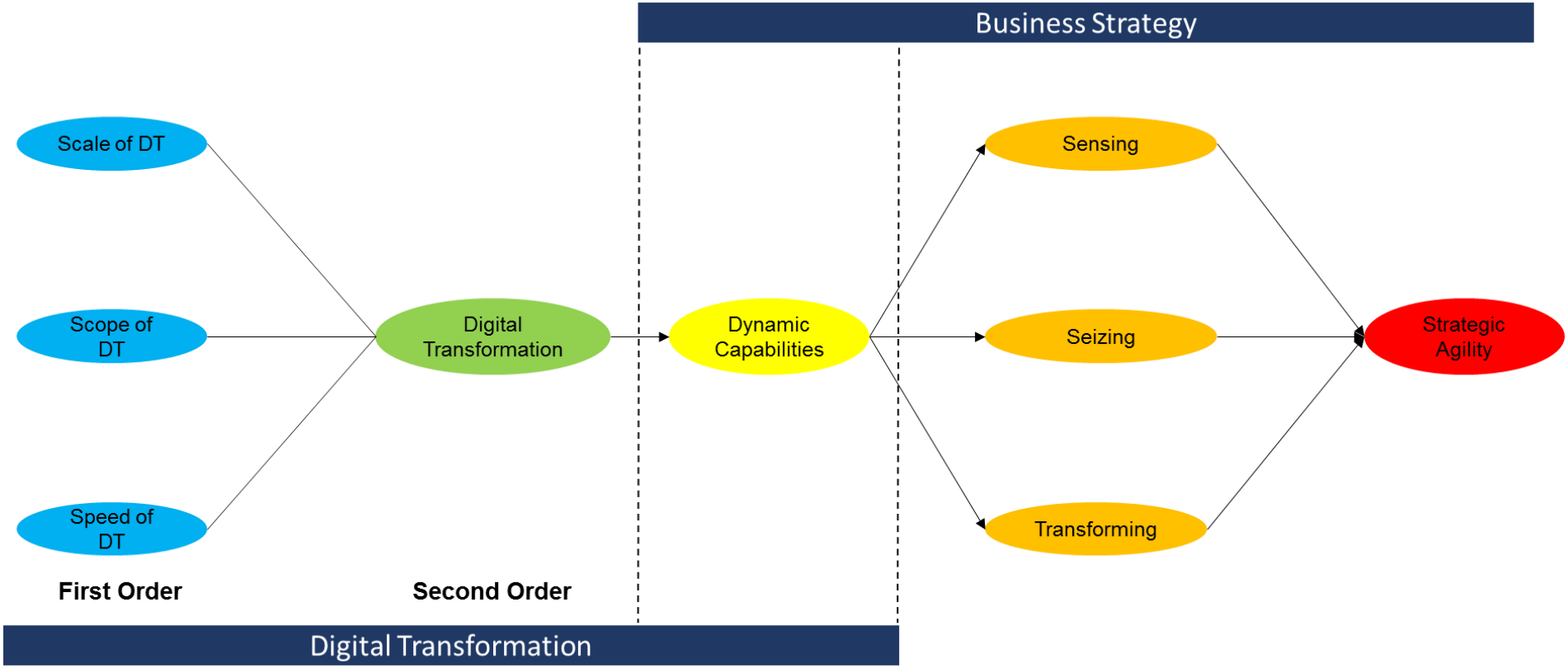

Figure 1: Theoretical model of the research study

3 RESEARCH HYPOTHESES

The ability to navigate the business environment of the new digital economy in a strategically agile manner is of increasing importance to the sustainability of business (Teece et al., 2016). While the global business community has progressively turned to DT in efforts to cultivate SA in their organisations, there is a lack of consensus on whether DT does, in fact, have a significant relationship with SA (Park et al., 2017; Fitzgerald et al., 2014). To this extent, this research examines the degree of significance of the relationship between DT and SA in a bid to contribute to the consolidation of the evidently scattered body of research pertaining to the two constructs (Bouwman et al., 2018). This is achieved through the assessment of the nature of the relationship of three endogenous components of DT (scope, scale and speed) and SA. Furthermore, the extent to which the respective components cumulatively relate to SA will be assessed, both for the significance of their contribution to the relationship and for the direction of the contribution realised.

3.1 Hypothesis One

H_1: there is a significant relationship between the scope of digital transformation and strategic agility

H_0: there is no significant relationship between the scope of digital transformation and strategic agility

The quest for competitive advantage has led to the exploration of digitally inclined means of developing and operationalising core competencies that support the strategic objectives of organisations operating in the modern economy (Matt et al., 2015). An understanding of the extent to which DT enacted across a firm has implications for its SA is of paramount importance as resources that are typically limited are directed towards DT in lieu of other competing organisational functions and needs (Bharadwaj et al., 2013). Further understanding of the influence of scope of DT on SA is warranted by the fact that varying scopes of transformation have implications for several dimensions of the business such as its value proposition, operational backbone and operational platforms.

3.2 Hypothesis Two

H_2: there is a significant relationship between the scale of digital transformation and strategic agility

H_0: there is no significant relationship between the scale of digital transformation and strategic agility

The concept of the scale of DT allows for the assignment of a measure of intensity of the commitment of resources into a given DT scope in an organisation. The legacy of the Industrial Revolution business era has cemented the impression that scale is inversely proportional to the cost of a particular business application – in essence, larger scale translates to a lower overall cost (Bharadwaja et al., 2013). A sound understanding of the role of scale in the relationship of DT and SA is essential, as from a digital vantage point, unlike in the industrial sense, scale is a function of dynamic scaling capabilities, the abundance of information, inter organisational alliances, and network effects (Bharadwaja et al., 2013). Scale can thus have a counter-intuitive impact on SA (Tallon & Pinsonneault, 2011; Weill et al., 2002). The contribution of scale to the relationship of the constructs must, therefore, be understood and adjusted for in the execution of DT that is geared towards strategic objectives.

3.3 Hypothesis Three

H_3: there is a significant relationship between the speed of digital transformation and strategic agility

H_0: there is no significant relationship between the speed of digital transformation and strategic agility

Cognisance of the rate at which DT is effected as well as the implications of that rate of transformation on the strategic position of a firm is of critical importance (Pagani, 2013). While it is usually the most relatable of the components of DT under consideration in this study (Fichman et al., 2014), speed of DT in the digital economy entails multiple dimensions such as its impact on the introduction of products to market, decision-making capabilities and alliance formation potential (Bharadwaj et al., 2013). Approached from a different angle that places an organisation in an ecosystem, the speed of DT and its relationship with SA is a function of the rate of change of the environment within that ecosystem. A reciprocal association is therefore at play wherein the initiative taken by a firm concerning its rate of DT is counteracted by a pull effect from the environment.

3.4 Hypothesis Four

H_4: strategic agility is influenced collectively by the three components of digital transformation

H_0: strategic agility is not influenced collectively by the three components of digital transformation

The literature is not clear on the nature of the contribution of the three components of DT under consideration to the overall relationship between DT and SA. While some studies propose that different combinations of the DT elements appeal to different industries and environmental circumstances (Berman, 2012), others remain neutral in their perception of their degree of variation across different contexts (Bharadwaj et al., 2013). This hypothesis will assess the cumulative impact of the three components of DT on SA, thereby satisfying the assumption of neutrality of opinion concerning possible variation in the contribution of DT components based on the circumstances surrounding an organisation. It will also go a step further by assessing the individual contribution of each DT component to the observed combined impact of DT on SA.

Figure 2 is an updated diagrammatic representation of the theory model in Figure 1. Included in this figure are the relative points of effect of the hypotheses introduced in this section. The dashed outline around **H_4** signifies that the lines from **H_1** to **H_3** respectively run directly to the second order DT oval, as well as to a point of accumulation representative of **H_4** as introduced in Section 3.4.

The next Section presents the methodology followed in conducting this research. It provides a detailed account of the proceedings of the study, from the researcher's philosophy going into the study through to the testing of the hypotheses outlined in Section 3. It also makes mention of the limitations of the methodology that were noted by the researcher.

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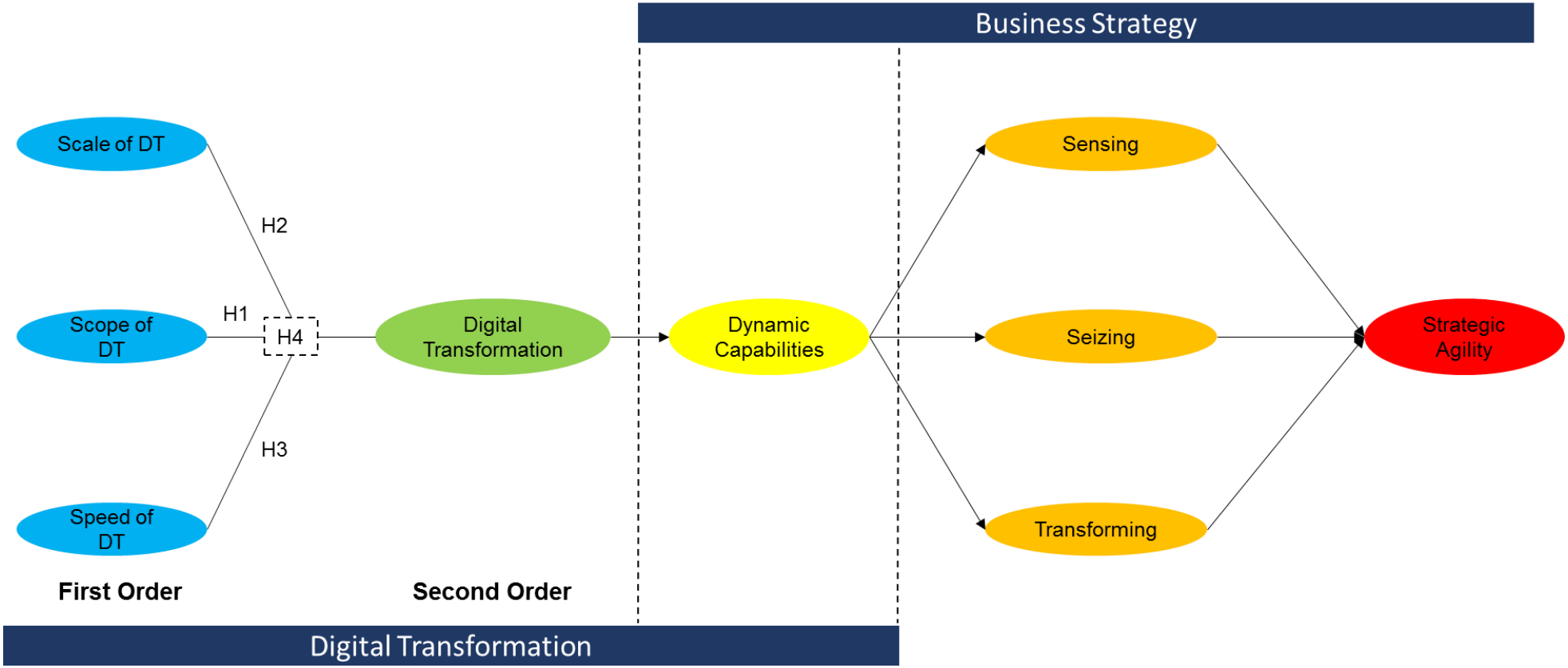

Figure 2: Hypotheses model

4 RESEARCH METHODOLOGY AND DESIGN

4.1 Introduction

Research philosophy informs research strategy, overall methodology and study execution. This section explains the approach that was followed in conducting the research, detailing the chronology of the study from the philosophical setting to the operationalisation of the methodology.

4.2 Choice of methodology

4.2.1 Research philosophy

The purpose of the study was to develop a critical understanding of the nature of the relationship between DT and SA. Based on that premise, the research philosophy or "system of beliefs and assumptions about the development and nature of knowledge" (Saunders & Lewis, 2018, p. 106) that guided the execution of the study was positivism. While several research philosophies exist, including realism, interpretivism and pragmatism, positivism was selected as it draws focus to measurable phenomena with the expectation that the data collected will be objective and supportive of the establishment of relationships internal to the data (Saunders & Lewis, 2018). Positivism therefore allowed for the relationship between DT and SA to be evaluated in the natural business environment with empirical assessment of hypotheses and assumptions derived from theory. As is characteristic of this approach, a structured survey questionnaire was used to collect data on the ordinates of the constructs from the environment.

4.2.2 Research approach

The study sought to increase the level of understanding on how DT actually relates to SA in the business environment. Both constructs have been divisive academic discussion topics for a considerable period. Points of near confluence have been tested in the fields of information systems and information technology, with a multitude of research methodologies and models explored. The availability of this background, in addition to the simple research model consisting of one dependent variable (strategic agility) and one independent variable (digital transformation), informed the selection of a deductive approach to the study. The existing theoretical framework of dynamic

capabilities (Teece et al., 2016) introduced in Section 2 was used as a lens through which the study was channelled (Saunders & Lewis, 2018). This allowed for the triangulation of quantifiable elements between the theory and the data. Furthermore, the time constraint for the completion of the research was in alignment with the adoption of a pre-existing theoretical base, as opposed to the development of a new theory, as is characteristic of an inductive study.

4.2.3 Research strategy

The independent variable elements considered for assessment in the research, in the form of constructs, were hypothesised to have discrete and collective influence on the dependent variable. This pointed to the adoption of a quantitative mono-method characterised by the collection of quantitative research data for statistical testing of the hypothesised relationships (Yilmaz, 2013; Saunders & Lewis, 2018; Harwell, 2011). The selection of this method cemented the case for the deductive approach. The coupling of the quantitative method and the deductive approach implied that the outcomes of the study would effectively be limited to the concerned scope and setting research.

Academic discussions (Sambamurthy, Bharadwaj & Grover, 2003) have been advanced on the use of information technology to enhance SA; however, alternative thought leaders maintain that DT and the ideas around it are still at a formative stage (Bharadwaj et al., 2013). This suggests that the benefits of DT in terms of its influence on SA remain to be quantified (Fitzgerald et al., 2014). Given this research purpose, the study could not be approached as an exploratory endeavour as its direction, intention and scope were not amenable to changes informed by insights gathered during the process. It also could not be approached in a descriptive fashion as this would not have sufficed to ensure that the relationships between the constructs were investigated at the depth intended for the study. It was therefore fitting that the research adopt an explanatory style in order to gain an understanding of the nature of the relationship between the two constructs (Saunders & Lewis, 2018; Zikmund, Babin, Carr & Griffin, 2009). The explanatory approach drove the study further than would be typical of a descriptive research study, seeking quantitative evidence of the association between the two constructs.

4.2.4 Data collection method

In line with the envisaged explanatory nature of the study, a survey research strategy in the form of an online self-administered questionnaire was applied. This strategy was

deemed to be the most suitable option for the study as the standardised nature (Brannen, 2005) of the data collection tool typically used in a survey enabled similar data collection conditions, in terms of structure, to be observed across the population that was to be sampled (Saunders & Lewis, 2018). This was expected to improve the objectivity of the findings of the study. Furthermore, it allowed greater potential for reaching more prospective respondents (by electronic communication means) in order to achieve a statistically significant sample size.

4.2.5 Research time horizon

The research execution time horizon was cross-sectional (Saunders & Lewis, 2018): that is, data on the artefacts of the perceived relationship between DT and SA were collected from participants within a short space of time (two months) without consideration of the variance in the state of the relationship between the constructs over time. This effectively resembled a “snap-shot” of the state of the link between the two constructs in the natural business environment during that brief period (Zikmund et al., 2009). Although the observation of a longitudinal time horizon would have allowed for the capturing of the evolutionary characteristics of the relationship between the constructs over a given period of time, the limited time available for the completion of the study lent itself to a cross-sectional horizon. Furthermore, the cross-sectional aspect allowed for the completion of the research despite constrained access to the required participant sample.

4.3 Research design

4.4 Population

The population deemed relevant to the study comprised junior, middle, senior and executive level managers of all disciplines in South African business organisations. This characteristic population was required to have engaged in the adoption and/or use of respective forms of digital technology in pursuit of delivering value to their respective customers. They were also required to have been involved in their organisations’ strategic matters in dispensing their duties. These conditions ensured that the target population essentially comprised individuals participating in advancing their organisations from conventional strategies to ones formulated and executed by leveraging the use of digital technology (Park et al., 2017).

Focus was drawn to these levels of management as it was anticipated that this would make the population under consideration more homogeneous, resulting in the key benefit of consistency in the quality of data collected from participants. Furthermore, it was expected that this homogeneity would play an equally important role in streamlining the channels for distributing the data collection tool to potential participants. Channels of communication exploitable in the selected population included access to email, smart phones, social and professional-social media. Moreover, it was anticipated that this target population was highly likely to consult and interact with seniors and other like-minded professionals on matters of DT and SA, thereby potentially distributing the data collection tool to a wider range of similarly informed individuals in their networks.

It was decided that including participants that were not involved in the deliberation of inputs to, or execution of, strategy would dilute the integrity of the study's findings and thus its validity (Lu & Ramamurthy, 2011). The exclusion of lower levels of employees thus negated the introduction of moderating factors such as inexperience in dealing with matters around the constructs of the study in their organisations, and the ability to recognise causal relationships in the business environment that their business was party to.

Although the target population was sought in companies of various sizes engaged in correspondingly different levels of digital technology, it was anticipated that the factor of size would be counterbalanced by the fact that the technology employed would be of a standard observed to be necessary to meet the strategic needs of the organisations in question. As such, the functions of the target population were then reduced to their functional interaction with the employment of digital technology to meet their organisations' strategic agendas. Starting from this point, the target population was intentionally sought out across companies of all sizes according to the South African National Small Business Amendment Act of 2003 (2003) as shown in Table 1.

Table 1: Summary of business size definitions (National Small Business Amendment Act of 2003)

Enterprise Size	Number of Employees	Total Turnover per Annum R('000)
Small	20 to 50	500 to 25000
Medium	51 to 200	26000 to 50000
Large	201+	51000+

4.5 Unit of analysis

The unit of analysis for the research study was the individual manager from which response data was sourced (Lewis-beck, Bryman & Futing Liao, 2004). Participants were essentially junior, middle senior and executive level managers, which implied that the unit of analysis was pegged at strategic deliberation and strategic execution levels within organisations. This choice of unit of analysis was appropriate because each response provided a data point which uniquely contributed to the understanding of the relationship between the constructs of the study, and in turn, the research problem.

4.6 Sampling method and samples size

A complete list of the target population was not available as acquiring such a list was impractical in spite of the focus on a particular strata of professionals in the South African business community. This implies that there was no target sampling frame at the onset of the study. The absence of a sampling frame precluded the use of probability sampling techniques (Saunders & Lewis, 2018). Subsequently, a non-probability sampling technique will be utilized.

Because the study was to be based on individual perceptions and opinions about the state of the relationship between DT and SA in the South African context, it was important to achieve the widest possible representation of relevant individuals. Judgement, implicit in purposive sampling, was therefore exercised in selecting participants who fit the profile required (Saunders & Lewis, 2018). It was duly noted that the use of the researcher's judgement and the undefined sampling frame at the onset of the study precluded the use of statistical inference to generalise the findings to a larger population.

A list of individuals who met the required characteristics was composed, featuring the contact numbers and emails of the individuals identified. These individuals were members of the researcher's direct network. In its entirety, the list included individuals from industries including mining, health care, telecommunications, retail, consulting services, civil and construction, professional service, finance and education. The wide representation of industries in the list was intended to increase the likelihood that all sectors of business within the geographical scope of the study would be represented, thus allowing for more holistic findings on the perceived state of the relationship between the constructs to be drawn from the study. The compiled list was then used to communicate the questionnaire to the potential participants.

In assessing the choice of the sampling method, it was envisaged that a large enough purposive sample of participants of the requisite profile would not be available to the researcher. Consequently, snowball sampling was utilised as a secondary non-probability sampling method in addition to the purposive sampling alluded to (Saunders & Lewis, 2018). Through this approach, the target participants accessible to the researcher were leveraged to gain access to the respondents' network of peers thereby increasing the reach of the questionnaire to potential participants. The downfall of this approach was that it created the opportunity for the introduction of bias from the accumulation of participants (through the chain of peer recommendation) who subscribe to a particular point of view on the subject of DT and its influence on SA (Sunders & Lewis, 2018; Zikmund et al., 2009). An advantage was, however, gained from the base of purposive sampling, while augmenting its shortfall (access to participants) with the advantage (low cost and faster acquisition of respondents) of snowball sampling.

In similar studies, theory was tested deductively with sample targets of about 214 to 300 participants (Chen, Wang, Nevo, Jin, Wang & Chow, 2014; Panda & Rath, 2015). Such studies involved upwards of five variables, thus satisfying the observations of Ho (2006) which suggested that at least 10 responses should be acquired for every variable measured to achieve a statistically significant sample. This is particularly true when combined with the added condition of the typically acceptable response rate of approximately 25% (Deutskens, De Ruyter, Wetzels, & Oosterveld, 2004). Kline (2011), on the other hand, recommended the same figure of 10 responses per variable as the lower limit, and not the ideal scenario of data adequacy. Instead, he recommended a more rigorous upper limit of 20 responses per variable in order to satisfy the condition of maximum likelihood that statistical significance would be satisfied across various statistical tests. Given that data on four variables was to be collected in the assessment of the constructs in this study, the target sample that would allow for the achievement of a statistically significant sample size was estimated to be at least 80 responses. At an estimated response rate of 25%, 320 participants that met the requisite respondent profile had to be presented with the survey.

4.7 Measurement instrument

Based on the fact that the core of the research was modelled around an entirely deductive approach drawing on the foundation of work from various authors discussed in Section 2, the measurement instrument that was used to collect data was correspondingly adapted from the host of studies cited. Blocks of questions pursuant to collecting data on the constructs were adapted from the different sources and compiled

into a single combined online self-administered questionnaire. True to the nature of deductive research, questions from rigorously validated data collection instruments were used in order to enhance the probability that the measurement instrument for the study collected the data that was actually intended (Saunders & Lewis, 2018; Creswell, 2014). Furthermore, this approach was practicably sound given that the development of a data collection tool from first principles would have required immense effort and time and would have stretched the study beyond its scope. This choice of measurement instrument was further supported by the fact that it was appropriate for the requisite participant profile as it offered flexibility for the completion time and location of the questionnaire (Allen, 2017).

Albeit well suited for the type of study and the time constraints under which it was conducted, the measurement tool presented potentially negative aspects. The first of these included the fact that members of the target population could easily choose to ignore the questionnaire link they received, resulting in low response rates. Also, those that attempted the questionnaire could have misinterpreted the questions and simply skipped questions that they did not comprehend, or that required a slightly higher engagement of their intellect. The probability of these potential hindrances affecting the study was mitigated by conducting a pilot phase of the measurement tool in order to establish its suitability for collecting relevant and sufficient data from participants. This process is discussed in Section 4.9.

4.8 Questionnaire design

The questionnaire comprised three main parts (see Section 9.1). The first section contained the landing page that provided participants with a brief introduction to the cause they were participating in. This included brief descriptions of the basic meanings of the terms used to describe the constructs in the study to ensure clarity of terminology in the context within which the questions in the tool were asked. Also stated explicitly in this section were the consent conditions preceding the respondents' participation in completing the survey.

The second section of the data collection tool featured demographic and qualifying questions to obtain basic profiling information from the respondent such as their designation, duration of post-qualification experience, tenure at the current organisation and hierarchical position in the organisation. This information was a key input to the classification of the respondents' suitability relative to the profile of desired individuals.

The third section then presented the questions that were formulated to “tease out” insights on the study variables from participating respondents. These questions were in line with, and spoke to, the hypotheses of the study. The composition of this section was as follows:

Scope of DT **(Variable 1):** question one was directed at the scope of DT. It was composed of four sub-questions adapted from the work of Bharadwaj et al. (2013) and Tallon and Pinsonneault (2011).

Scale of DT **(Variable 2):** the second and third questions were collectively geared towards the variable of the scale of DT. The sub-questions of the respective questions were adapted from the works of Bharadwaj (2013), Chen et al. (2014) and Lu and Ramamurthy (2011).

Speed of DT **(Variable 3):** the fourth and fifth questions were also adapted from the research conducted by Bharadwaj (2013); Chen et al. (2014) and Lu and Ramamurthy (2011). They were focussed on the variable of the speed of DT.

Further to the targeted questions above, two other questions (questions six and seven) were included in the data collection tool. These served the purposes of gauging SA **(Variable 4)** and establishing the collective effect of the three variables investigated through questions one through five on SA. These questions were adapted from the work of Bharadwaj et al. (2013) and Lu and Ramamurthy (2011).

A seven-point Likert scale (where 1 represents “strongly agree” and 7 represents “strongly disagree”) was used in the measuring tool in order to elicit the opinion and beliefs of the participants on the constructs (Chen et al., 2014; Lu & Ramamurthy, 2011; Saunders & Lewis, 2018; Lavrakas, 2008). This scale was observed throughout the questions in the third section of the questionnaire in order to maintain consistency and reduce the possibility of introducing undue human error in the selection of responses by participants.

4.9 Questionnaire pre-testing process

4.9.1 Screening phase

The first step in the process of evaluating the design and flow of the research questionnaire was a preliminary appraisal done by the researcher’s supervisor. Following that initial approval of the basic structure of the questionnaire, it was submitted to the research ethics committee with the accompanying application documents. The

objective of this step was to assess the questionnaire and proposed approach for potential violation of the institution's research ethics codes. With ethics approval granted, a more detailed assessment of the questionnaire was conducted by the researcher and the supervisor. Stemming from this step was the decision to increase the granularity of questions investigating the second and third variables (scale and speed respectively) so that valuable insights on those variables would not be lost to an overly focused line of questioning. Following the same train of thought, an additional question was added to the final hypothesis to increase the depth of questioning and the cumulative effect of the variables on SA. This improved questionnaire was submitted for a second round of ethical clearance, which was granted ahead of testing of the questionnaire (see Section 9.2).

4.9.2 Questionnaire piloting

To test the performance of the questionnaire in a real-world application, a pilot survey was conducted. This involved sending the survey to 15 individuals who met the profile of the target population of the study. Over and above completing the questionnaire, these individuals were subsequently requested to critique the questionnaire and give feedback on aspects such as ease of understanding, flow of questioning, and their overall impression of the composition of the questionnaire.

Of the selected respondents, 11 responses were obtained with accompanying feedback on their perception of the questionnaire. All the individuals who participated indicated that the line of questioning was targeted at select higher strata of an organisation's chain of command, which confirmed the effectiveness of the population targeting that had been intended as the pilot test participants were of that level of designation. Although a few minor changes were recommended by participants, the feedback also confirmed that the wording of the questionnaire was adequately comprehensible to the relevant target population.

The completion time of the questionnaire was initially estimated at 20 minutes considering the number of questions. The piloting of the questionnaire revealed that it was in fact completed in an average of 6 minutes with all 34 questions answered. This further supported the ease of understanding and adequacy of population targeting that had been undertaken.

4.10 Data gathering process

The vehicle used for the distribution of the online self-administered questionnaire was the Survey Monkey™ platform. A link to the survey was created in the platform, allowing it to be sent to the individuals in the target population through various convenient media. The use of this survey tool eliminated the geographical and logistical limitations that would have otherwise hindered the distribution of the questionnaire had the distribution of physical copies of the questionnaire been pursued (Saunders & Lewis, 2018; Zikmund et al., 2009).

In an effort to ensure the best possible response and completion rates, the following process was observed in the data collection process (Saunders & Lewis, 2018):

- A cover letter was prepared introducing the research and author. It included a strict commitment to confidentiality and the anonymity of respondents, with assurance that only aggregated response data would be collected. The cover letter served as an introduction to the data collection tool. A statement was included in the letter specifying that participation in the survey was voluntary, and that continuing with the survey served as consent towards participating in the study.
- A list of purposively selected individuals who met the criteria of the target population was developed. Details of these individuals, which included phone numbers and email addresses, were recorded. These individuals were contacted and informed of the intentions of the study and their contribution, if they chose to participate. This was done ahead of sending the actual data collection link to the individuals in order to prepare them to receive a survey link.
- The cover letter was sent to individuals as the initial step. It alerted the participants that a second communication would be sent to them containing a research questionnaire link with a request for completion of the survey before a set period. A follow-up email was sent to the initial recipients of the questionnaire link in intervals of one week thanking those that had already completed the survey and reminding and encouraging those who had not completed the survey questionnaire to do so. Furthermore, in satisfaction of the secondary sampling method chosen for the study, the recipients of the email were requested to share the questionnaire link with other individuals in their network who met the target population criteria detailed in the communication sent to them.

- In an attempt to increase the number of responses acquired, the scope of the channels used to reach the potential target population was increased to include WhatsApp and LinkedIn. This amendment to the strategy was adopted following the observation that responses from the population of interest had stagnated.

In total, this data collection approach resulted in the achievement of 107 responses from the intended total of 320 target population individuals who the questionnaire was meant to reach, either sent directly by the researcher or referred by a participant who had completed the survey. This was accomplished during a data collection duration of two months. The completion rate of the data collection exercise could not be estimated accurately due to the multi-channel approach to data collection. Given that Deutskens et al. (2004) indicated a completion rate of 25% as the typical response figure, it was found that the accumulated response total was adequate for continuation with the study. The data collected was thus deemed sufficient for the condition of statistical significance to have been satisfied.

4.11 Data analysis approach

As data was collected using a Likert scale, it was statistically classifiable as numeric and quantitative. Given the fact that the digits assigned to each of the response classes of the Likert scale did not represent real numbers, the data was further distinguished as being of discrete interval quality (Wegner, 2016). The online questionnaire medium of data collection implied that it could be conveniently downloaded and manipulated using available software packages such as Microsoft Excel and SPSS (Statistical Package for Social Sciences). These software tools were used to conduct descriptive and higher order statistical analysis, as well as to investigate the statistical implications of the data gathered on the variables of interest on the hypotheses set out for the study.

4.11.1 Data preparation

The chosen medium of data collection, Survey Monkey™, allowed for data collected to be exported as a downloadable Excel spreadsheet. This meant that the data was pre-consolidated by the survey platform and presented in a format comprising a table with the list of numbered questions and the associated responses (as shown in Table 25 of Section 9.3). As a seven-point Likert scale was used to categorise the opinions of the respondents, the response data was in the form of text strings. A process of codification was then conducted on the raw text string data to convert the text responses to numeric equivalents shown in Table 26 in preparation for the data analysis phase that would

follow. This was done according to the code book presented in Table 27. This process was automated by programming a spreadsheet to manipulate the data; “Strongly Agree” was assigned a numeric value of one, while on the other end of the spectrum, “Strongly Disagree” was assigned a value of seven. The respective responses in between the two extremes were assigned discrete numeric values between one and seven.

Also conducted during the phase of data preparation was the codification of the variables and item lists in the data collection tool. This was done to declutter the entire data set so that clear attention could be drawn to the actual response data being dealt with. With the data preparation completed in Microsoft Excel, the data was imported into SPSS where further configuration of parameters was conducted. This included setting up the classification of the data type, alignment of the ordinates of the study’s Likert scale with the numeric responses imported into SPSS, and classification of the variable types. This was done to ensure that the software’s data-handling protocols remained aligned with the type of data being dealt with throughout the analysis phase that would follow.

4.11.2 Imputation of missing data

The rationale behind the adoption of an imputation process was based on the finding that 50% of respondents to a questionnaire were likely to leave at least one question unanswered (King, Honaker, Joseph & Scheve, 2001). Furthermore, King et al. (2001) explained that the deletion of response cases (ie. a complete questionnaire data set from a respondent) is used by researchers in 94% of survey-related cases in an attempt to reduce the impact of the missing data on their study. This is said to result in a loss of up to 33% of data in research studies, which in itself constitutes a severe loss of information that perpetuates a contaminative selection bias that arguably alters the integrity of the findings (King et at., 2001).

Scheffer (2002) and Graham (2009) describe three types of missing data situations termed as missingness mechanisms. The first mechanism, MAR (Missing At Random), is ascribed to a situation in which the missingness is attributable to a certain ‘X’ or dependent variable in the set of data, and not attributable to the ‘Ý’ or dependent variable. The second mechanism, NMAR (Not Missing at Random), is ascribed to a situation in which the missingness of the data is attributable to the actual values of the missing data. The third mechanism of missingness, MCAR (Missing Completely At Random), is ascribed to a situation in which the missingness observed does not depend on any variables of interest represented in the data set, neither dependent nor independent.

A pattern was observed in which the 16 response cases were missing answers to the same successive 29 or 25 questions in an alternating fashion. Further investigation into whether the respondents of the 16 cases were characteristically related confirmed that they were not of consistent demographic characteristics. This suggested that the missingness observed was not dependent on a particular attribute of the variables represented in the data which could have invoked a uniform pattern of response from individuals. It was thus concluded that the missingness would be classified as MCAR as it appeared not to have been dependent on the study variables. This assumption of MCAR missingness validated the decision of listwise deletion of the 16 cases in question from the data set, thus removing them completely (Scheffer, 2002).

The need to ensure that data sets are complete (i.e rectangular) is a prerequisite to the successful execution of various statistical computations (Scheffer, 2002). As a result, a process of data imputation, which involves the introduction of “data fillers” (based on valid values from other respondents) to missing response data in order to complete the data set prior to conducting further in-depth analysis, was followed for seven cases which also had missing data. In accordance with Hair, Black, Babin and Anderson (2010), Scheffer (2002) and Graham (2009), this approach can be exercised in situations where at least 50% of the questions in a response case have been completed – which was the case with the seven response cases mentioned.

Alternative methods for data imputation include substitution with known values and calculation of replacement values (Hair et al., 2010). In the case of the former, missing values are adopted from sources such as similar studies (Cold Deck Imputation), other respondents in the data set (Hot Deck Imputation) and by substituting complete response cases with new respondent cases from which data had previously not been collected (Case Substitution). In the latter case, means of valid responses are calculated to replace the missing data (Mean Substitution), and missing values are predicted using regression analysis (Regression Imputation).

In this study, the known replacement methods were avoided because of their dependence on the use of a single value to substitute for the missing data based on the matching characteristics between respondents. The regression imputation was not selected on account of the fact that it required the critical assumption that the variables with missing data correlated significantly with other variables represented in the data set (Hair et al., 2010). This would have been a premature assumption at this stage in the study. As a result, mean substitution was selected as the imputation method of choice. Not only was this method identified as the most widely used method of imputation, but it

was also the simplest to apply despite its known disadvantages of understating variances, possible distortion of distribution of data set and possible depression of correlations when mean values are found to be the same for a large proportion of the missingness (Hair et al., 2010). Despite the stated disadvantages, this method was further preferred due to the fact that imputed data was representative of the aggregate mind-set of respondents concerning the variables, which was in line with the bearing of the study.

To achieve the most representative average imputation figures, three characteristics of designation, company size and level of DT were used as anchors to identify data points that could be averaged in the data set. These values were then averaged and imputed by coded formulae in Excel. A sample of the imputed data is shown in Table 28 of Section 9.3.

4.11.3 Descriptive statistics

Data profiling was used to gain a broad overview of the behaviour of the variables represented by the data. This included assessments of the overall central tendency and the dispersion and the skewness of the data that was collected. The formulation and assessment of the descriptive statistics also investigated the presence of outliers and the overall effect they had on the data set. This was used to confirm the appropriate statistical descriptive measures that should be used to describe the profile the data.

Furthermore, proportionality calculations were used to describe the external characteristics of the data such as the response rate, the completion rate and respective frequencies. Representation of data emanating from the descriptive statistics took the form of various graphs and charts selected for their efficacy in portraying the desired qualities of the data.

4.11.4 Normality of data

Normal distribution of data is a prerequisite assumption for the majority of parametric type statistical tests. The normality of distribution of sample data is a function of the spread of the data about the mean, which serves as an indicator of central location (Wegner, 2016). In addition to the mean, the skewness of the distribution, that is, its deviation away from a bell-shaped curve symmetrically dissected through the mean, indicates the bias of the data underlying the distribution to the right or left of the central location measure (Hair et al., 2010). Kurtosis, another measure, indicates “peakedness” of the distribution when compared to a normal distribution (Hair et al., 2010).

The Shapiro-Wilk test is commonly used for the assessment of normality of data distributions (Field, 2013). It hypothesises that a distribution's deviation from normality is insignificant when $p > 0.05$ and significant when $p < 0.05$. It was used as an initial test for normality of distribution; however, due to its sensitivity to error-inducing hypersensitivity which results in increased likelihood of declaration of significance as sample size becomes larger, other determinants of normality were considered to allow for the triangulation of findings (Field, 2013). To this extent, Q-Q (Quantile – Quantile) plots were used to confirm the findings of the Shapiro-Wilk test. Q-Q plots assess normality by plotting the expected quantiles of the data set (which form a straight line) against the quantiles of the individual data points (Pallant, 2007; Field, 2013). An indication of normality is denoted by the points appearing to "hug" the straight line.

Following the above, the skewness statistic was used as a numerical means of quantifying the extent of deviation from normality in each case. Pearson's coefficient of skewness was calculated for each case with limits of acceptable skewness set between -1 and +1 (Hair et al., 2010; Field, 2013; Wegner, 2016). A perfectly normal distribution would have been denoted by a skewness coefficient of 0. Cases that had values beyond the boundaries of -1 and +1 were flagged as potential outliers.

Inspection of histograms of the distributions allowed the researcher to get a sense of the gravity of deviation from normality due to the influence of outliers. Suspected bimodality observed in the histograms was investigated by re-calculating the skewness statistics while controlling for the categorical variables of company size, age range, designation and level of DT. Persistence of the apparent bimodality, given this factor control, disqualified the suspicion that the observed characteristic was due to inhomogeneity caused by these external factors. An internal factor such as the scarcity of neutral "Neither Agree nor Disagree" responses bore merit, warranting corrective action of outliers as opposed to segmentation of the data set into more homogeneous sub-samples (Wegner, 2016).

4.11.5 Outliers

While the skewness statistic highlighted the outliers, it did not suffice as a means of informing the manner or degree of correction to be actioned on outliers. Due to the limitation of the sample size, the preservation of the number of cases was deemed paramount. As a result, outliers were winsorised as an alternative course of action to deletion of data points or entire cases from the dataset. Winsorising enhances statistical power derivable from a data set, contrary to the deletion of outlying data also known as

trimming (Davidov, Jelsema & Spedada, 2018; Dixon, 1960; Field, 2013). As an alternative approach, transformation of the data set would have improved the degree of normality of the distribution, however, the item scores would have changed during the process of transformation, thereby altering their meaning to the study; it would have complicated the interpretability of the scores in the results of the study (Hair et al., 2010; Grayson, 2004).

The process of winsorising is nuanced. In the form applied in this research, Z-statistics of all the non-categorical response data (that is from Q6 to Q34) were calculated. For each variable, Likert item scores of all the responses with Z-statistics greater than two standard deviations (ie. beyond the range of $Z = \pm 1.96$) from the mean were replaced with the value of the nearest scores within the same variable that were deemed not to be outliers (ie. variable scores where the Z-statistic was closest to, and within the limits of $Z = \pm 1.96$). This insured a 95% confidence level that the values replacing the outlying scores were within two standard deviations of the mean without introducing bias in favour of or against the hypotheses of the study (Field, 2013).

4.11.6 Measuring the validity of constructs

Construct validity is explored as a means of allowing a researcher to establish whether the inferences that they have made regarding the outcome of the application of their instrument are consequential. It effectively assesses whether the instrument in question actually measures what it is intended to measure, and whether the results are meaningful to the context of the study (Cronbach & Meehl, 1955). Messick (1998) highlighted that construct validity elucidates the degree to which the empirical outcome of the instrument's application in a study aligns with the underlying theory and context that forms the very basis of the study in question. This proposition by Messick (1998) implies that the validity of constructs is of paramount importance as it determines whether the respective constructs actually align with the hypotheses tested in the study and whether the data collected using the instrument will be contextually relevant to prove or disprove the hypotheses (Collier & Adcock, 2001). Failure to adequately measure the validity of constructs would preclude the effecting of necessary corrections to the influence of random errors in the data set. This would result in the potential acceptance or rejection of the study hypotheses due to causes other than the adequacy of the theory that was used to generate those hypotheses (Bagozzi, Yi & Phillips, 1991).

Given the foundation outlined above, the constructs that were behind the data collected using the measuring instrument were assessed for validity as a prerequisite to any further

statistical analysis. This was a fundamentally important step in the process of ensuring alignment between the theory, hypotheses, constructs and data collected. Two distinctly dissimilar methods were used to assess construct validity thus allowing for the postulated validity to be triangulated (Campbell & Fiske, 1959). With this approach, the true extent to which the findings were affected by the measuring instrument could be established (Straub, 1989).

The first assessment took the form of a Pearson's correlation matrix which assessed whether the bi-variant correlations between the Likert items in each construct were above 0.3 (Beavers, Lounsbury, Richards, Huck, Skolits & Esquivel, 2013; Hair et al., 2010) as presented in Section 5.5.1. The second mode of validation took the form of factor analysis, starting with exploratory factor analysis (EFA) and followed by confirmatory factor analysis (CFA).

Assumptions of factor analysis

The four requisite assumptions for factor analysis were investigated (Hair et al., 2010). The first assumption satisfied was that the data was continuous as supported by the use of a Likert scale in this study (Norman, 2010). The second assumption was that there was a linear relationship between scale items. This was tested by graphical inspection of the sampled bivariate plots as shown in Figure 16. The third assumption was that there were no outliers in the data set. This assumption was satisfied as detailed in Section 4.11.5. The fourth assumption pertained to the adequacy of the sample size. The satisfaction of this assumption remained a limitation of the study for reasons elaborated upon in Section 5.2.

Execution of factor analysis

As a pre-requisite to the EFA, the data set was submitted to the KMO (Kaiser-Meyer-Olkin) to assess the adequacy of the sample size relative to the number of constructs in the study, and to Bartlett's tests of sphericity to assess whether the data could be factorised (Field, 2013). The outcomes of the tests are documented in Section 5.5.2.

Subsequently, EFA was conducted on the individual survey constructs using the principal component factor extraction method with a cut-off of Eigenvalues greater than one (Field, 2013). Oblamin rotation was applied where more than one component was extracted, as the component correlation matrix in Table 50 indicated that the two components may

have been correlated (Field, 2013; Beavers et al., 2013). Other orthogonal rotations were available, such as the commonly applied Varimax rotation; however, they were not suitable for application in this study due to the evidence of component correlation mentioned above. The EFA was conducted a second time pooling all scale items together to test for consistency of loadings within factors before proceeding to the CFA. The outcome of the EFA is summarised in Table 5.

The factor items from the EFA were then submitted to the CFA for analysis of the respective factor constructs. A composite first-order factor model (shown in Figure 21) was then constructed by correlating the factor models in Figure 17 to Figure 20. The correlated model was optimised through the removal of scale items that co-varied strongly with items from other constructs (Kock & Lynn, 2012). This process was conducted in an iterative fashion (with over 21 iterations), with the model being run intermittently in between iterations to test for the attainment of validity. Convergent and discriminant validity was then assessed for the optimised model by calculating the AVE (average variance extracted) and the MSV (maximum shared variance) values, where MSV should be less than AVE for discriminant validity and the square-root of AVE should be greater than the correlations within respective factor-constructs for convergent validity (Hair et al., 2010). The CR (composite reliability) was also calculated to confirm the reliability of the optimised CFA model in support of the Cronbach's alpha discussion in Section 4.11.7. While alpha assumes uni-dimensionality and equal factor loadings, CR takes into consideration variances in factor loadings making it a robust test for reliability of the CFA optimised model carried forward (Bacon, Sauer, P & Young, 1995).

4.11.7 Measuring the reliability of the instrument

Research in the public health science domain has shown that the full extent of a variable can seldom be assessed precisely or explicitly (Bland & Altman, 1997). Instead, by assessing the various constituent elements relating to the variable through a converging series of questions, it is possible to increase the ability to infer the correct measure about the state of the variable (Cronbach, 1951; Bland & Altman, 1997). Essentially, combining implicit questions geared at assessing a variable allows for the achievement of a more reliable measure of that variable regardless of the presence of interference introduced by different perspectives of participating individuals on the subject under investigation.

This convergent line of questioning implies that a series of questions should ideally be measuring the same factor. In a measuring instrument such as the one used in this

research, this introduces the need for correlation between the components of the instrument, which Cortina (1993) suggests is required on two levels. First, there should be correlation between the dimensions or variables that are being assessed using the instrument. Second, each of the items or questions assessing each particular variable should be correlated. The sum-product of these correlations gives rise to internal consistency, meaning that in measuring the variables of interest, the measuring instrument will reliably produce consistent results regardless of differences of application (Bland & Altman, 1997; Cortina, 1993).

Although it is by no means the only measure of the reliability of a measurement instrument, Cronbach's alpha (Cronbach, 1951) is a commonly adopted measure in academic research (Bland & Altman, 1997). In addition to enabling the researcher to operationalise the brief background described above, Cronbach's alpha was selected as the primary test of the reliability of the data-collection instrument. Its suitability was due to its split-half approach to the determination of internal consistency using a single sample in line with the short time frame under which the study was conducted. It also assisted with not sterilizing the already constrained pool of potential purposively sampled respondents available to the researcher, which would have been the case if a second sample had to be collected to test for equivariance between samples and the reliability of the instrument (Cronbach, 1951).

Cronbach's alpha is given by the following mathematical expression:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum S_i^2}{S_t^2}\right)$$

Where: k is the number of items under consideration,S_i^2 is the variance of each *i*th item and S_t^2 is the variance of the total score after each of the weighted *i* th items have been added up (Bland & Altman, 1997; Cronbach, 1951).

The literature frequently states that there is a lack of consensus on what the appropriate limit of Cronbach's alpha should be (Bland & Altman, 1997; Bonett & Wright, 2015; Cortina, 1993). While some deem values in the range of the 0.60 to 0.70 to be acceptable, Cortina (1993) cautioned that context should be take into consideration when assessing an alpha value measured for an instrument. He argued that the greater the number of items tested for reliability, the higher alpha values tend to be as there is simply a higher probability of correlation between items. Given this argument, the

instrument used in this study was assessed for internal consistency using one continuous list of items (that is, without separating the items into the four separate variable dimensions under investigation), and then the test was conducted again for the four dimensions with the items grouped per dimension. This division of the dimensions of the instrument into the smallest possible discrete blocks of items ensured that a high level of rigour was observed in assessing the instrument relative to the chosen threshold of alpha, which was set at 0.7 for this research study (Bland & Altman, 1997; Bonett & Wright, 2015; Cortina, 1993).

4.11.8 Descriptive profile of factored constructs

Through the process of EFA and CFA, an optimised measurement model was developed. The achievement of the optimised and validated model required changes to be effected to the initial measurement instrument, which warranted the re-characterisation of the factored constructs that resulted through descriptive statistics. The means of the items in each of the respective factors discussed in Section 5.5 were calculated to form a composite representation of the respective factored constructs. A summary of the descriptive statistics of the confirmed factors is presented in Table 8, and a detailed account of the descriptive statistics per item is shown in Table 58.

Analysis of variance (ANOVA) using the *F*-test was conducted to compare the means between controlled groups within the data set as outlined in Section 5.6.2. The groups were controlled using the categorical variables of age range, management level, duration of tenure, size of company and the level of DT achieved by their respondents' organisations. In each case of the evaluation, the level of significance observed was $p < 0.05$ (Wegner, 2016; Hair et al., 2010).

Post hoc analysis (presented in Section 5.6.3) was conducted for closer inspection of the categorical comparison based on levels of DT of respondents' firms. This followed the indication of a potentially statistically significant difference between groups based on the aforementioned control variable. In each case of the post hoc analysis, the level of significance observed was $p < 0.05$ (Wegner, 2016; Hair et al., 2010).

4.12 Hypotheses testing

4.12.1 Assessing the relationships between the constructs

The primary question that the study sought to answer was whether there was a relationship between DT and SA. To answer this question, three null hypotheses

postulating a relationship between components of the independent variable (DT) and the dependent variable (SA) were composed. Assessment of the correlations between constructs was conducted in order to understand the degree of association between them. This assessment, presented in Section 5.7.1, was in line with the testing of hypotheses **H_1**, **H_2** and **H_3**. The null hypothesis in each case was that there was a significant relationship between each of the independent variables and SA – the dependent variable.

With this association understood, the extent to which one construct varied in relation to changes in another was highlighted (Zikmund et al., 2009). Pearson's product moment correlation was selected for this construct relationship assessment as it is reputed to be particularly suitable for analyses where interval type variables are concerned, which was the case in this study (Zikmund et al., 2009).

The outcome of the Pearson's correlation assessment was a range of values of the correlation coefficient "*r*" between -1 and +1, where -1 implied that the constructs concerned had a perfect negative relationship and +1 implied that the constructs concerned had a perfect positive relationship. Pearson's correlation is given by the mathematical expression:

$$r = \frac{n\Sigma xy - \Sigma x\Sigma y}{\sqrt{[n\Sigma x^2 - (\Sigma x)^2] \times [n\Sigma y^2 - (\Sigma y)^2]}}$$

The implication of the positive correlation implied that the behaviour of the constructs in question was similar, while a negative relationship suggested that the behaviour of the constructs mirrored each other, but in opposite directions. A correlation coefficient of 0 was expected to imply that there was no correlation between the constructs, while the larger the absolute value of "*r*", the stronger the correlation would be (Wegner, 2016). Although other measures of correlation or goodness of fit exist, such as the non-parametric Spearman's rho and Kendall's tau, Pearson's coefficient was applied as the primary measure of correlation in this study as it is the most suitable for applications where the data is considered to be continuous, as was the case in this study (Hair et al., 2010). As a secondary and confirmatory step, Spearman's rho correlations were also evaluated on the data to confirm the suitability of Pearson's correlation as primary correlation measure. The convergence of values of Pearson's "*r*" and Spearman's rho

served as confirmation that the data satisfied the assumptions of normality and that the testing of the hypotheses using this method was validated (Field, 2013).

4.12.2 The multiple linear regression model of strategic agility and digital transformation

A fourth hypothesis postulating a significant relationship between the three variables collectively and the independent variable was also synthesized. The intention at the outset of the study was to apply structural equation modelling (SEM) in order to test for causality between the independent variables of DT and the dependent variable of SA (Hair et al., 2010). Three of the four primary prerequisites for the establishment of causality were present in this study. These were the evidence of covariation between the independent and dependent variables, the absence of non-spurious relationships, and the theoretical support for the exploration of causal relationship provided by the literature reviewed. The condition surrounding the requirement of evidence of a temporal sequence of events was not met. This was primarily due to the fact that satisfying this condition requires a research design that is experimental or one that provides longitudinal type data (Hair et al., 2010). An experimental set up allows the researcher to maintain control of an element of interest while manipulating other elements and observing the causal outcome; longitudinal studies similarly allow for the time factor to be accounted as an inherently controlled aspect of the research in question (Hair et al., 2010). A final concern that limited the full application of the SEM was the researcher's inability to acquire a large enough number of cases to allow for the development of a stable model. Given that it is common practice to work with sample sizes of $N = 150$ or more in SEM studies (Hair et al., 2010), the usable sample size achieved in this study would not have allowed for a robust execution of SEM despite the achievement of the valid and optimised CFA model.

As an alternative to the SEM, multivariate linear regression was conducted to determine whether the collective components of DT that had been identified in literature had a significant relationship with SA. Although causality could not be assessed using this method, dependence between the constructs could be investigated in satisfaction of the key objectives set out for research.

It is recommended that 15 to 20 cases of data be acquired for each independent variable for the application of regression analysis and to allow the regression model developed to be sufficiently robust and extendable to populations beyond the sample of the study

(Hair et al., 2010). Given that 90 usable cases were achieved, application of multiple regression analysis in this study was appropriate.

With the inter-variable relationship having been assessed in Section 4.12.1, this set of testing focused on establishing whether the regression model that resulted was valid, whether each variable was valid, and how each of the independent variable components contributed to the ability of the regression model to predict the behaviour of the dependent variable (Wegner, 2016). The outcome of the regression process is presented in Section 5.7.2.

Assumptions of multiple linear regression

The three assumptions requisite to the execution of multiple linear regression were satisfied. The first assumption was that there was linearity between variables submitted to the multiple regression. This was addressed through graphical inspection of the sampled bivariate plots shown in Figure 16. The second assumption was that the data was homoscedastic. This characteristic was evaluated graphically by plotting the graph of Figure 22, wherein the assumption was deemed to have been satisfied based on the diagonally channelled appearance observed in data points in the figure (Hair et al., 2010). The third assumption was that the data was normally distributed. The satisfaction of this assumption was addressed in Section 4.11.8 and Section 5.6.1.

Execution of multiple linear regression

A multiple linear regression was conducted to assess the relationship between the combined sub-constructs of DT and SA. The multiple linear regression was conducted in a stepwise fashion, through building three consecutive models. In each case, the number of regressor variables was increased by one. This allowed for the influence of each construct component to be observed and accounted for leading up to the final model, Model 3. Within the regression, ANOVA was used to test the significance of each regression model based on the *F*-test. Furthermore, the two-tailed *t*-test was used to assess the significance of each regressor in the model; a significance level of $p < 0.05$ was observed across the regression process (Wegner, 2016). The outcome of the regression analysis process is presented in Section 5.7.2.

4.13 Limitations of the methodology

Several limitations to the optimum execution of the methodology described were identified. These are summarised as follows:

Bias: as the perceptions and beliefs of the respondents were captured using an online questionnaire, it was expected that a degree of bias would feature in the data. This expectation arose due to the self-reporting fashion in which data was collected from the respondents. In one case, a target participant reported that they feared they were bound to be biased as they worked for a company that dealt heavily with matters of DT.

Distribution: due to the fact that the questionnaire was distributed through an online medium, potential respondents in the target population were limited to those who had access to internet facilities and could therefore access the questionnaire on their computers or smart mobile devices. Even then, many of the target population individuals that were in possession of the required basic technology to receive and complete the survey questionnaire did not. This is reflected in the response rates achieved.

Generalisability: due to the fact that non-probability sampling methods were applied, application of inferential statistics on the sample data will not be possible as the findings will not be generalizable to a larger population.

Target population dilution: in an attempt to increase the number of samples acquired, the scope of data collection was expanded to include contact via email, Whatsapp and LinkedIn. Although this increased the number of responses acquired beyond the minimum limit that was required, the possibility existed that respondents may have passed the questionnaire link on to individuals who strictly did not match the requisite

target population characteristics. This was managed for the first level of individuals who were purposively selected by the researcher as they had all been evaluated and found suitable. While some control was maintained by asking individuals to send contact details of individuals they wished to nominate, some may well have accessed the survey and surpassed the initial questions and instructions used to assess participants' eligibility.

Industry focus: the nature of the study lent itself to participants from all industries and sectors. Given that including responses from various industries may be perceived to dilute the focus of the research, the study targeted a relatively narrow band of respondents in organisations. As a result of this selectivity, the achievement of sufficient questionnaire responses proved to be a challenge even with the inclusion of a secondary sampling method of snowballing.

Time frame: the cross-sectional nature of the study meant that the opinions captured in the responses of individuals were likely to be heavily influenced by their circumstances at the time of completing the questionnaire. In terms of the broader design of the study, the issue of the time frame could well have cost valuable insights that could have been gained from examining the relationship of the constructs in a longitudinal time frame fashion.

Response detail: the standardized nature of the data collection tool sterilised the nuanced information that could have been gained from respondents being allowed to provide detailed responses in their own words. Furthermore, the ability to advance follow-up questions to the respondents was not afforded by the measurement tool and method applied.

Completion rate: the fact that the researcher was not in the presence of the respondents when the questionnaire was completed meant that it was not possible to attend to queries or areas that may have required clarification. It is expected that this had an impact on the completion rate of questionnaires as questions that may have been ill understood would have simply been left unanswered.

Response rate: the absence of the researcher when the questionnaire was received electronically meant that there was generally no urgency for target individuals to complete the research questionnaire within the desired time frame, if at all. This may have contributed to the response rate not being higher than what was observed relative to the sample size initially targeted.

Online activity trust: there is generally a negative perception towards emails and all communications of an electronic nature that contain links of any kind due to phishing

scams and other related cyber-crime. As a result, it was borne in mind that matters of cyber-trust would have an impact on the ability to collect data from individuals in the target population. This was especially the case as the selected strata of individuals are typically prime targets for cyber-related attacks due to their designation, network and respective organisation access. This was highlighted by several such individuals contacting the researcher to verify the source of the emails and questionnaire, following which they requested that it be sent to them again as the previous one had been deleted due to fear that it was a phishing scheme disguised under the researcher's credentials.

A schematic summary of the methodology observed in the study is shown in Figure 3. The following section consists of the results that emanated from its execution. Summaries of pertinent items of data which are specific to respective outcomes outlined in this methodology are included in the discussions of this following section, while detailed outputs from the analysis processes are shown in Section 9.

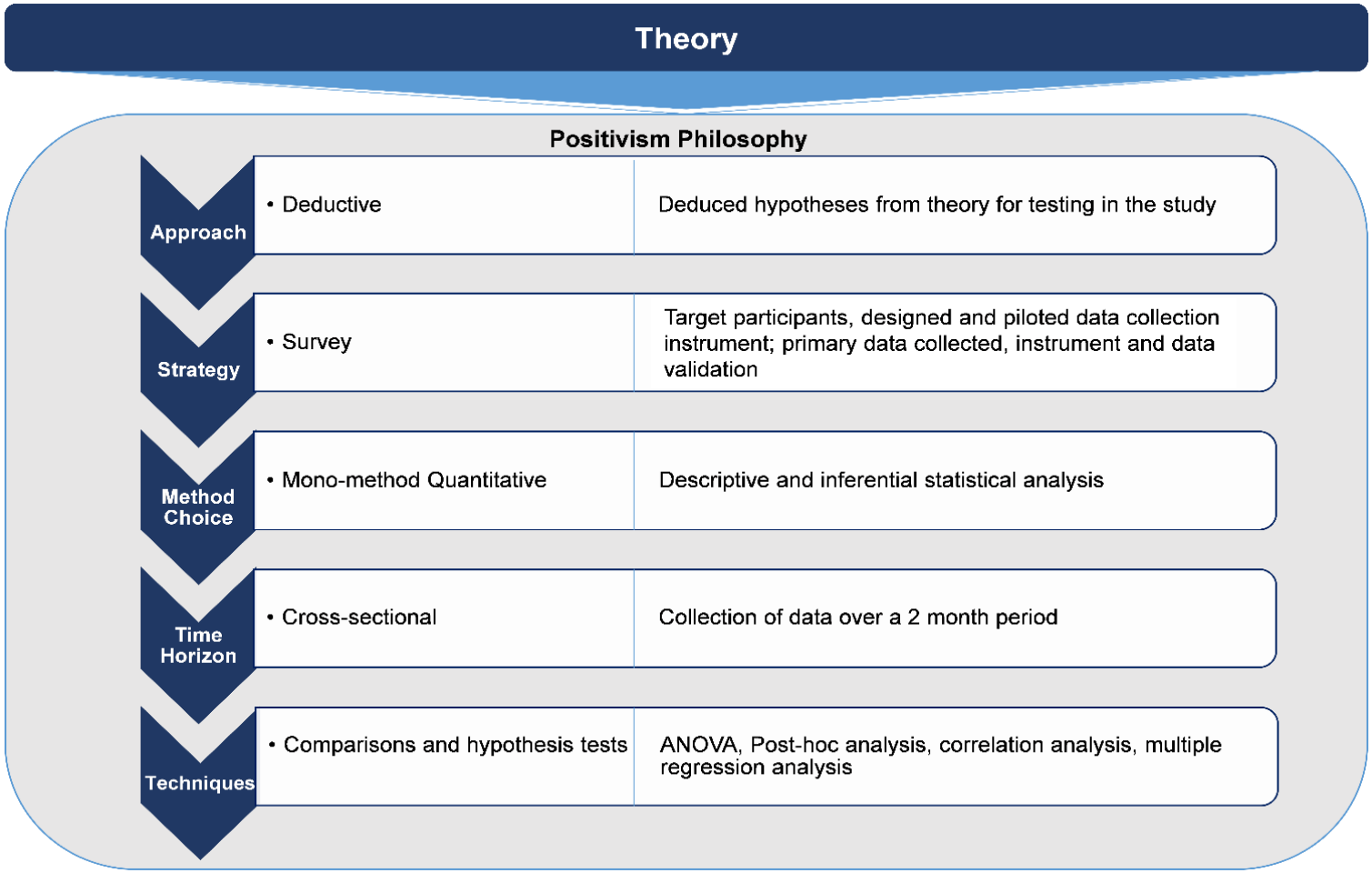

Figure 3: Summary of research methodology

5 RESULTS

5.1 Introduction

This section presents the results of the study. Following the chronology outlined in Section 4, it first outlines the results of the stage of data collection and preparation. It then introduces the reader to the various measures taken to assess the internal consistency of the data collection tool as well as outcomes of the steps taken to evaluate the validity of the data applied in further analysis. The section then presents results of the hypotheses that were tested, with detailed data outputs shown in the appendices highlighted in the text.

5.2 Descriptive characterisation of the sample of data

5.2.1 Raw sample size

As informed by Kline (2011) and previous studies of similar composition (Chen et al., 2014; Panda & Rath, 2015), the sample size that was deemed to be acceptable for the satisfaction of statistical significance for most statistical tests given the number of variables was 80. As such, with a projected response rate of 25% (see Deutskens et al, 2004), the minimum number of suitable participants initially targeted was 320.

The purposive sample of candidates who met the criteria of the target population that the researcher was able to compile from their personal network came to a total of 304 individuals. Of these, the researcher was able to source 239 email addresses and was only in possession of the mobile phone numbers for the balance of the individuals. These individuals were contacted via email and WhatsApp with a request for referrals to suitable candidates serving as a third channel of distributing the data collection tool in a snowballing fashion in order to meet the 320 target sample.

Due to the underwhelming number of responses acquired in response to collection campaigns using the channels mentioned, LinkedIn was introduced as a fourth channel of data sourcing. All response data was collected and collated using the Survey Monkey™ platform. Samples of the raw and coded data in question are shown in Table 25 and Table 26 respectively. The data was coded according to the codebook in Table 27.

5.2.2 Response and completion rates

The multichannel data collection approach that was observed precludes the accurate estimation of the total number of suitable candidates that received the questionnaire. Of the 239 targeted individuals that were emailed, 54% accessed the emails, but only 38% of those that accessed the email proceeded to access the survey using the link provided. This equates to a survey click-through rate of 11% of the 239 emails sent. The response rate could be generally described as low, which warranted the exhaustion of the alternative data collection methods applied.

A sum of 107 of the total polled individuals that the questionnaire reached satisfied the initial screening, which took the form of agreeing to the fact that they were at least of junior management level designation in their respective organisations. Of these, 17 of the responses were found to have been corrupted in a manner that resembled an alternating pattern of 25 or 29 unanswered questions. This meant that a resultant 90 responses were found to be suitable for further analysis – (ie. more than 50% of the questionnaire completed). This equated to 84% of the total 107 responses received.

5.2.3 Missing data imputation and total data sample

Following the process of imputation described in Section 4.11.2, the number of total responses that could have been possessed was reduced by 15.9% through this deletion. The remaining 83 cases represented responses in which more than 50% of the questionnaires had been completed. These made up 84.1% of the total responses that had been acquired. Within the 83 cases that passed deletion screening, imputation was conducted on seven (comprising 57 data points). Given that 83 cases were qualified for further analysis, the 57 data points imputed represented 1.9% of the data that would be carried forward in the study. Furthermore, this meant that 76 of the total 107 cases reflected a completion rate of 100%, which translated to an overall response rate of 71% for the study. A sample of the imputed data is presented in Table 28.

The overall impression highlighted by this table is that the majority of the respondents were those within the target sample who were well versed enough on the subject to enable them to complete the entire questionnaire. This is reflected by the fact that that only 7 cases out of the useful sum of 90 required imputation – contrary to the findings of King et al. (2010) –and further that the imputation accounted for less than 2% of the total data points collected.

Table 2: Data collection and imputation summary

Attribute	Number	% of Total
Total respondents	107	100%
Total potential responses	3638	100%
Listwise case deletion	17	15.9%
+50% of Questionnaire Complete	90	84.1%
Respondent Cases imputed	7	7.8%
Answers imputed	57	1.9%
Answers collected	2584	71.0%
Overall completion rate	83	77.6%

5.2.4 Normality of data per survey question

The Shapiro-Wilk test was used to test for normality on all individual sample questions. It indicated an outcome of D (90) = 0.00, $p > 0.05$, suggesting significant deviation from normality on all counts (test output is shown in Table 30). Inspection of the normal Q-Q plots in Figure 15 revealed that overall, the data was fairly normally distributed, with the deviational influence in the observed values from 1 to 3 on the normal Q-Q plots attributable to a number of cases ranging between 2% and 11% of the total 90 cases wherein responses of 3 “Disagree” were collected. Three questions reflected a neutral response of 4 (Neither Agree nor Disagree), while the remaining questions had no neutral responses.

Pearson’s skewness coefficient was calculated to quantify the skewness observed in the histograms in Figure 15. The data showed that the distribution was predominantly left skewed, with an average absolute skewness value of 1.11 and an average kurtosis of 0.788.

Suspicions of bimodality in the data, based on observations of the histograms in Figure 15, were investigated. Controlling for categorical factors did not yield significant improvements in the average skewness of the factors of the controlled sub-sample distributions (data presented in Table 32 to Table 35). Average figures across the samples are summarised in Table 3. Of interest in this table is the fact that the change in bias represented by the skewness of the data ranged from 0.922 to 1.171 when the different categorical variables were controlled for. This implied that what appeared to be bimodality was more likely to have been due to an internal attribute of the data such as the scarcity of neutral responses as opposed to the inhomogeneity of the sample (Field, 2013). The sample data were thus treated as homogeneous going forward.

Table 3: Summary of categorical variable controlled skewness

	Skewness	% Change
Age	-1.169	-5.3%
Tenure	-1.171	-5.5%
Designation	-0.922	16.9%
Size	-1.050	5.4%
DT Level	-1.102	0.7%

5.2.5 Outliers

The Z-statistic at cut-off values of Z = ± 1.96 was used to identify outliers. A total of 162 data points were winsorised (see Table 29 for sample of winsorised data) as described in Section 4.11.5. This translated to a winsorising rate of 6.2%. The outcome of the exercise was that the resultant skewness of all variables was within -1 and +1 (see Table 31 vs Table 36), which implied improved normality of the underlying data distributions. Consequently, the winsorised data set was treated as normal in the remaining proceedings of the study.

5.3 Descriptive statistics of the respondents

At the beginning of the survey, five demographic questions were used to profile the respondents. These collected data on the respondent's age range, tenure at their current company, designation, company size and their company's digital transformation status. These will be discussed in this sub-section.

5.3.1 Age range

Of the 90 respondents forming the final sample, the majority were from the age category of 31 to 40 years. They accounted for 46% of the sample. The next significantly represented age category was the 0 to 30 age group at 34% of the sample. Lesser representation was observed in the age categories of 51 to 60 and above 61. Figure 4 is a representation of the various age range percentages indicated by the colour-coded key.

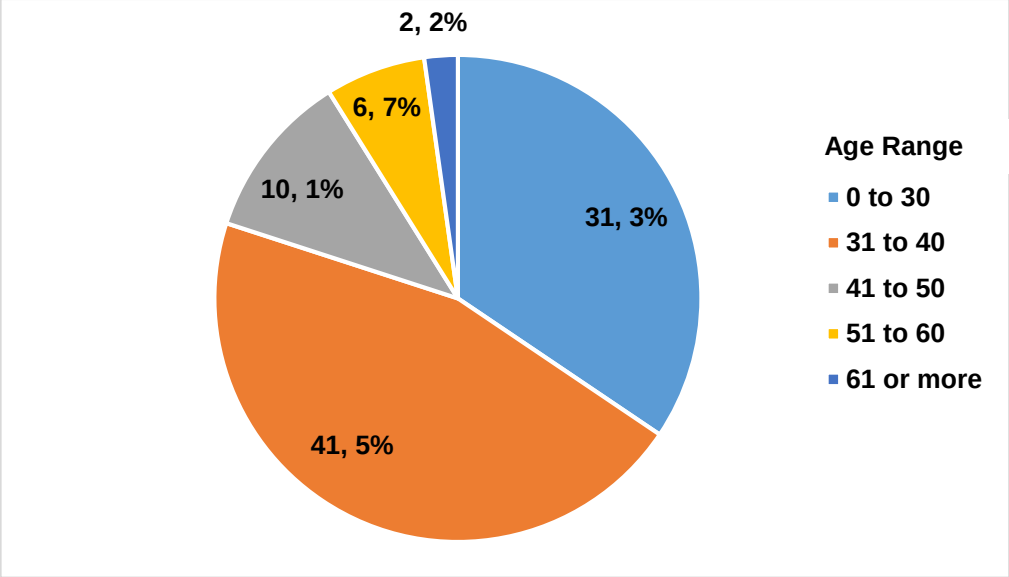

Figure 4: Distribution of respondents per age category

5.3.2 Tenure

The profiling data indicated that 68% of the respondents had been employed with their current companies for up to five years. They were followed by 24% of the sample who reported that they had been with their companies for equal to or more than six years, but not more than 10 years. An almost equal distribution of respondents had been with their companies for 11 to 15 years and more than 16 years respectively. The distribution of the respondent's tenure is shown in Figure 5 with the accompanying colour-coded key.

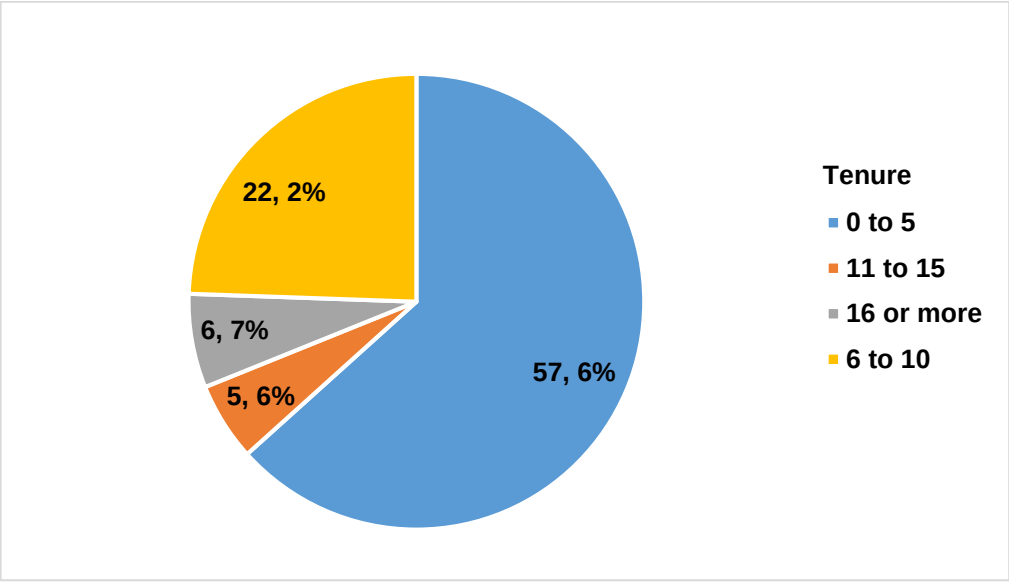

Figure 5: Distribution of respondents per tenure category

5.3.3 Designation

The minimum requirement for participation of respondents was that they fall under one of four levels of management depicted in Figure 6. The majority of the respondents were middle-level managers, accounting for almost half of the sample. Senior managers accounted for 19%, followed closely by lower-level management at 21%. The least represented management category was executive-level managers at 17% of the sample.

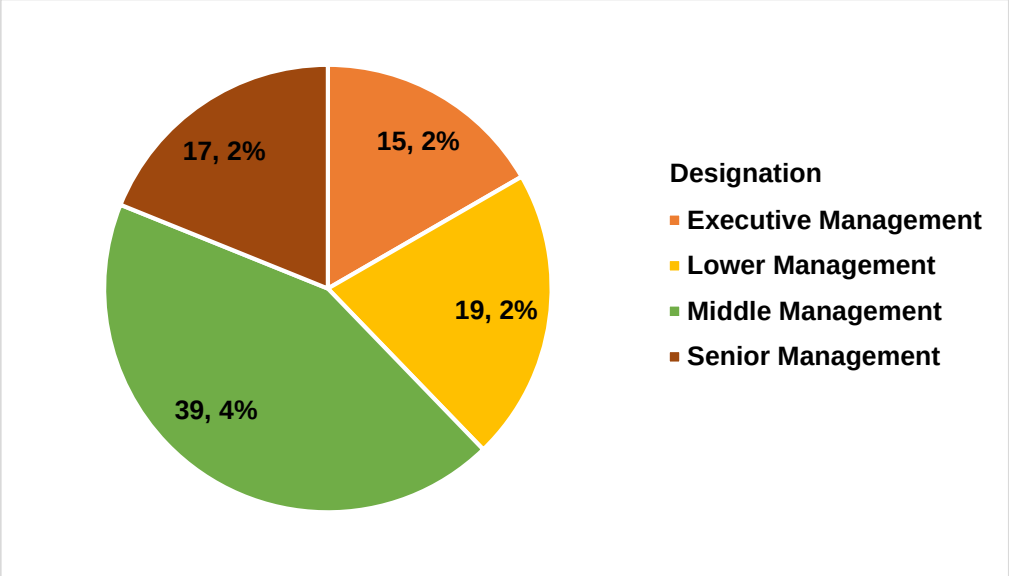

Figure 6: Distribution of respondents per management level category

5.3.4 Company size

Almost twice as many respondents were from large companies as compared to those from small companies. Large companies are classified as having over 201 employees and a turnover of over ZAR 51 million, while small companies have 20 to 50 employees and ZAR 0.5 to ZAR 2.5 million in turnover. Only 9% of the respondents worked in medium-sized companies, which are classified as having 51 to 200 employees and achieving ZAR 26 to ZAR 50 million in annual turnover. A graphical representation of the company size distribution is shown in Figure 7.

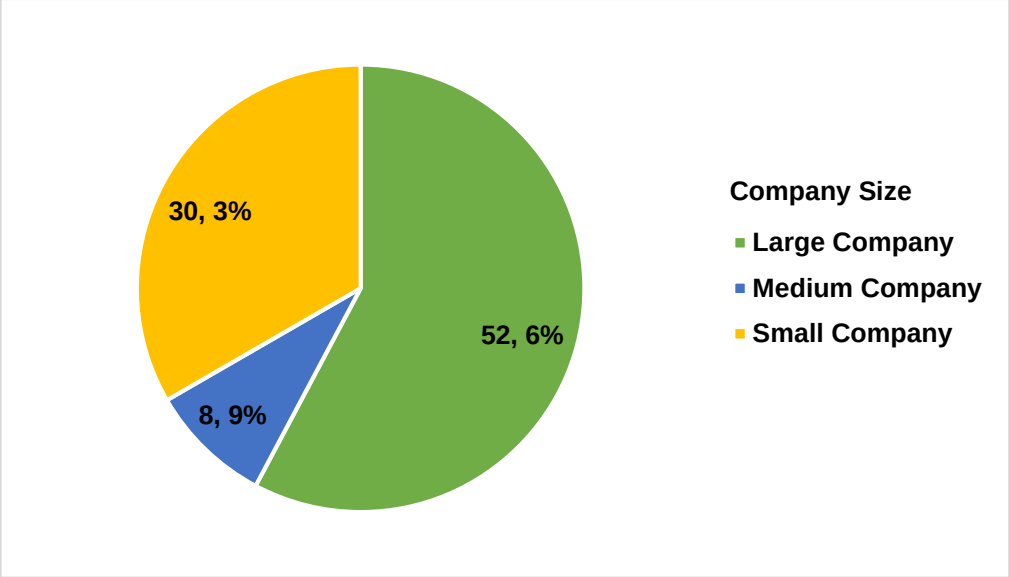

Figure 7: Distribution of respondents per company size category

5.3.5 Level of digital transformation

Despite the distribution of company sizes in the data collected, the reported levels of DT are more evenly spread across the sample categories. 38% of the sample reported that their organisation had achieved a medium level of DT, while 33% reported having achieved a high level of DT. To a slightly lesser extent, 29% of the sample reported having achieved little DT in their organisation. The breakdown of the DT level reported across the samples is shown in Figure 8.

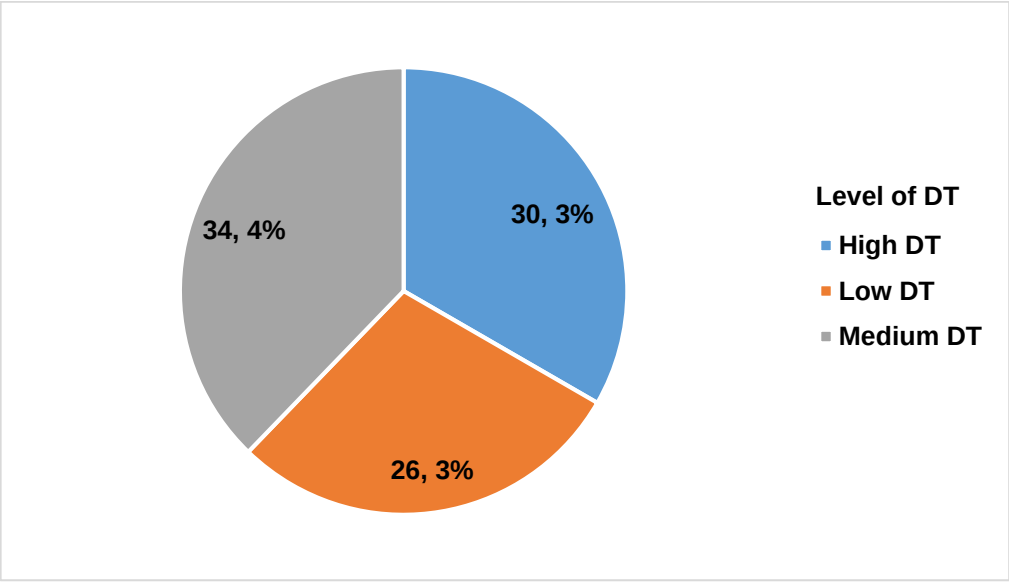

Figure 8: Distribution of respondents per DT level category

5.4 Internal reliability of constructs

The internal consistency of the scale was measured by calculating Cronbach's alpha. Values of alpha were calculated for each for the respective constructs in isolation. The outcomes of the alpha calculations are summarised in Table 4. All alpha values were observed to above the limit of 0.7 set for this study, therefore no scale items were deleted (Bland & Altman, 1997; Bonett & Wright, 2015; Cortina, 1993). This was of interest to the study as it confirmed that the data collection tool was indeed eliciting the intended information from the respondents regarding their perception of the relationship between the constructs. The minimum alpha value of 0.881 in Table 4 was indicative of this. Details of alpha values per construct are shown in Table 37 through Table 40. The overall scale was deemed appropriate for procession into subsequent stages of the study without alternation.

Table 4: Summary of internal consistency test

Construct	Sample Size	Items Submitted	Cronbach's Alpha
SCP	90	4	0.881
SCL	90	9	0.914
SPD	90	10	0.924
SA	90	6	0.887

5.5 Construct validity

5.5.1 Bivariate analysis of scale items

Correlation matrices (Table 41, Table 44, Table 47 and Table 52) showed strong correlation, with most coefficients significantly above 0.3 (Beavers et al., 2013). All item correlations were below 0.8 with the exception of items 16 and 17, which reflected correlations above 0.8. No observations were above the threshold of 0.9 (Field, 2013).

5.5.2 Exploratory factor analysis

Scale items were submitted to the KMO and Bartlett's tests (detailed figures in Table 42, Table 45, Table 48 and Table 53) to assess the adequacy of the sample achieved relative

to the number of constructs in the study. The resultant KMO was indicative of an adequate sample with values ranging from 0.781 to 0.904 for the four constructs (see Table 5). The typical threshold is 0.5 (Field, 2013).

Bartlett's test showed that the variances and co-variances within the constructs are proportional to the identity matrix, showing statistical significance at 406 degrees of freedom (where $p < 0.001$) (Field, 2013). The output of the respective tests, summarised in Table 5, suggested that the scale items were eligible for factor analysis. Furthermore, linearity was indicated first, by the Pearson's correlation determinants as being significantly greater than 0.00001 (Field, 2013) and second, by the visual inspection of the sampled bivariate linear relationships in Figure 16.

EFA was conducted (detailed output presented in Table 43, Table 46, Table 49 and Table 54) on the survey constructs using the principal component factor extraction method and Oblamin rotation. One factor was extracted in each of the cases for the SCP, SCL and SA constructs, as these had eigenvalues greater than one. The percentage variances by each factor extracted were 79.35%, 60.38% and 64.23% respectively shown in Table 5. Two factors were extracted in the case of the SPD construct with 60.49% of the variance explained by the factor.

Table 5: Exploratory factor analysis summary

Parameter	SCP	SCL	SPD	SA
Sample	90	90	90	90
Scale Items	4	9	10	6
KMO	0.781	0.895	0.907	0.864
Bartlett's Test	0.000	0.000	0.000	0.000
Factors Extracted	1	1	2	1
% Variance Explained	79.35	60.380	60.487	64.426

The EFA was re-run with all items concurrently (see Table 55) to confirm whether the factors that had been extracted previously would persistently load on the same components described above. All items loaded on the same factors with the exception of Component 2 of the SPD factor. This component loaded more with the SA factor, and as such, the items of this factor were re-assigned (Kock & Lynn, 2012) and treated as part of the SA factor going forward.

5.5.3 Confirmatory factor analysis

Confirmatory factor analysis (CFA) was conducted on the respective constructs (see Figure 17 to Figure 20). The model fit indices for the factors are summarised in Table 6. Values of CFI (comparative fit index) ranged between 0.914 and 0.967, while values of GFI (goodness of fit index) ranged between 0.839 and 0.970. Root mean squared error of approximation (RMSEA) values observed ranged between 0.134 and 0.247. While the RMSEA indices were not in favour of a good model fit, the CFI and GFI values were both indicative of a good fitting model (Hair et al., 2010). On the basis of the two supporting indices out of the three assessed, the model was deemed to be a satisfactory fit for the study.

Table 6: Model fit indices

Variable	CFI	GFI	RMSEA
DT Scope	0.933	0.916	0.247
DT Scale	0.967	0.970	0.140
DT Speed	1	1	-
SA	0.914	0.839	0.134

Convergent validity of the optimised measurement model (shown in Figure 21) was assessed by inspecting factor loadings Table 56. All factor loadings were above 0.7 (Hair et al., 2010) except for one measured variable which reflected a lower loading of 0.57. AVE (average variance extracted) values for the model were calculated and found to be greater than the threshold of 0.5, which confirmed convergent validity (Hair et al., 2010).

Divergent validity was assessed by calculating the MSV (maximum shard variance) from the inter-construct correlations in Table 57. These values ranged between 0.530 and 0.543. All resultant MSV values were less than the corresponding AVE values, which served to confirm the achievement of discriminant validity. CR (composite reliability) for the model was above 0.85 with the exception of DT Scale, which had a CR value of 0.777 (Bacon et al., 1995). This confirmed that the internal reliability of the model was preserved through the factor analysis and model optimisation process. The results of the described assessments from convergent and discriminant reliability indicators described are summarised in Table 7.

The underlined and emboldened diagonal figures in Table 7 are square roots of the corresponding AVE figures, calculated for the purpose of comparison of the inter-

construct correlation. All of these values were greater than the regular print correlations below them, thus supporting the absence of discriminant validity contraventions.

Table 7: Convergent and discriminant reliability indicators of the optimised first order factor model

Construct	CR	AVE	MSV	SA_Com	DT_Scope	DT_Scale	DT_Speed
SA_Com	0.863	0.613	0.543	**0.783**			
DT_Scope	0.868	0.688	0.530	0.622	**0.829**		
DT_Scale	0.777	0.543	0.530	0.724	0.728	**0.737**	
DT_Speed	0.852	0.657	0.543	0.737	0.672	0.707	**0.811**

5.6 Descriptive statistics of the factorised constructs

5.6.1 Data profile

The mean of the factored constructs ranged between 5.2 and 5.51, while the standard deviation ranged between 1.06 and 1.34. The distribution of the data in the factored constructs reflected a left skewed dominance, with skewness coefficients ranging from -0.65 to -0.794 indicated in Table 8. Kurtosis ranged from -0.251 to 0.228. Given the descriptive statistics observed, and that values of skewness and kurtosis were reasonably within the range of -1 to +1, further analysis proceeded under the assumption of acceptable data normality as indicated by the limits established in Section 5.2.

Table 8: Descriptive statistics of extracted factors

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
Factor Construct	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
F1_SA_Com	90	2.75	7.00	5.20	1.06	-0.757	0.254	0.228	0.503
F2_DT_Scope	90	3.00	7.00	5.51	1.09	-0.794	0.254	0.058	0.503
F3_DT_Speed	90	2.33	7.00	5.30	1.34	-0.751	0.254	-0.251	0.503
F4_DT_Scale	90	2.67	7.00	5.31	1.07	-0.650	0.254	-0.005	0.503
Valid N (listwise)	90								

5.6.2 Categorical variable constrained analysis

Analysis of variance (ANOVA) was conducted using the F-test in order to assess differences in means of responses across the five categorical variables for which data was collected.

Comparison by age range

No significant differences in means were observed in the ANOVA controlled for age range at the $p < 0.05$ level of significance. The ANOVA output in Table 9 shows that F (4, 85) = 0.180 for strategic agility; F (4, 85) = 0.355 for scope of DT; F (4, 85) = 0.542 for speed of DT; and F (4, 85) = 0.160 for scale of DT. In all cases the p – value was greater than 0.05, therefore indicating non-significant differences in means across the age ranges of the respondents.

Table 9: ANOVA of the various age ranges

		Sum of Squares	df	Mean Square	F	Sig.
Strategic Agility	Between Groups	0.831	4	0.208	0.180	0.948
	Within Groups	98.281	85	1.156		
	Total	99.112	89			
Scope of Digital Transformation	Between Groups	1.739	4	0.435	0.355	0.840
	Within Groups	104.083	85	1.225		
	Total	105.822	89			
Speed of Digital Transformation	Between Groups	3.960	4	0.990	0.542	0.705
	Within Groups	155.163	85	1.825		
	Total	159.122	89			
Scale of Digital Transformation	Between Groups	0.759	4	0.190	0.160	0.958
	Within Groups	100.847	85	1.186		
	Total	101.606	89			

Comparison by duration of tenure

No significant differences of means were observed in the ANOVA controlled for duration of tenure at the $p < 0.05$ level of significance. The ANOVA output in Table 10 shows that F (3, 86) = 0.523 for strategic agility; F (3, 86) = 0.460 for scope of DT; F (3, 86) = 0.774 for speed of DT; and F (3, 86) = 0.989 for scale of DT. In all cases the p-value was greater than 0.05, therefore indicating non-significant differences in means across the tenure duration categories of the respondents.

Table 10: ANOVA of the various durations of tenure

		Sum of Squares	df	Mean Square	F	Sig.
Strategic Agility	Between Groups	2.541	3	0.847	0.754	0.523
	Within Groups	96.571	86	1.123		
	Total	99.112	89			
Scope of Digital Transformation	Between Groups	3.115	3	1.038	0.869	0.460
	Within Groups	102.707	86	1.194		
	Total	105.822	89			
Speed of Digital Transformation	Between Groups	2.034	3	0.678	0.371	0.774
	Within Groups	157.088	86	1.827		
	Total	159.122	89			
Scale of Digital Transformation	Between Groups	0.147	3	0.049	0.042	0.989
	Within Groups	101.459	86	1.180		
	Total	101.606	89			

Comparison by designation

No significant differences in means were observed in the ANOVA controlled for the designation of respondents at the $p < 0.05$ level of significance. The ANOVA output in Table 11 shows that F (3, 86) = 0.844 for strategic agility; F (3, 86) = 0.312 for scope of DT; F (3, 86) = 0.379 for speed of DT; and F (3, 86) = 0.942 for scale of DT. In all cases the p – value was greater than 0.05, therefore indicating non-significant differences in means across the designation categories of the respondents.

Table 11: ANOVA of the levels of designation

		Sum of Squares	df	Mean Square	F	Sig.
Strategic Agility	Between Groups	0.939	3	0.313	0.274	0.844
	Within Groups	98.173	86	1.142		
	Total	99.112	89			
Scope of Digital Transformation	Between Groups	4.278	3	1.426	1.208	0.312
	Within Groups	101.544	86	1.181		
	Total	105.822	89			
Speed of Digital Transformation	Between Groups	5.569	3	1.856	1.040	0.379
	Within Groups	153.553	86	1.786		
	Total	159.122	89			
Scale of Digital Transformation	Between Groups	0.461	3	0.154	0.131	0.942
	Within Groups	101.145	86	1.176		
	Total	101.606	89			

Comparison by company size

No significant differences in means were observed in the ANOVA controlled for duration of tenure at the $p < 0.05$ level of significance. The ANOVA output in Table 12 shows that F (2, 87) = 0.593 for strategic agility; F (2, 87) = 0.356 for scope of DT; F (2, 87) = 0.732 for speed of DT; and F (2, 87) = 0.491 for scale of DT. In all cases the p – value was greater than 0.05, therefore indicating non-significant differences in means across the sizes of companies where respondents are employed.

Table 12: ANOVA based on company size

		Sum of Squares	df	Mean Square	F	Sig.
Strategic Agility	Between Groups	1.184	2	0.592	0.526	0.593
	Within Groups	97.928	87	1.126		
	Total	99.112	89			
Scope of Digital Transformation	Between Groups	2.482	2	1.241	1.045	0.356
	Within Groups	103.340	87	1.188		
	Total	105.822	89			
Speed of Digital Transformation	Between Groups	1.139	2	0.569	0.314	0.732
	Within Groups	157.983	87	1.816		
	Total	159.122	89			
Scale of Digital Transformation	Between Groups	1.646	2	0.823	0.716	0.491
	Within Groups	99.960	87	1.149		
	Total	101.606	89			

Comparison by level of digital transformation

A significant difference of means was observed in the ANOVA controlled for the level of digital transformation in the organisations where respondents were employed at the $p < 0.05$ level of significance. The ANOVA output in Table 13 shows that F (2, 87) = 0.042 for strategic agility; F (2, 87) = 0.000 for scope of DT; F (2, 87) = 0.000 for speed of DT; and F (2, 87) = 0.044 for scale of DT. In all cases the p – value was less than 0.05, therefore indicating a significant difference in the means of at least one pair of digital transformation levels. This warranted further post hoc analysis into the different conditions between the groups.

Table 13: ANOVA based on level of digital transformation in the organisation

		Sum of Squares	df	Mean Square	F	Sig.
Strategic Agility	Between Groups	6.963	2	3.482	3.287	0.042
	Within Groups	92.149	87	1.059		
	Total	99.112	89			
Scope of Digital Transformation	Between Groups	20.683	2	10.341	10.567	0.000
	Within Groups	85.139	87	0.979		
	Total	105.822	89			
Speed of Digital Transformation	Between Groups	41.210	2	20.605	15.203	0.000
	Within Groups	117.913	87	1.355		
	Total	159.122	89			
Scale of Digital Transformation	Between Groups	7.029	2	3.514	3.233	0.044
	Within Groups	94.578	87	1.087		
	Total	101.606	89			

5.6.3 Post hoc analysis for levels of digital transformation

Further to the significant ANOVA result for DT levels achieved by organisations where respondents worked, post hoc analysis was conducted to compare mean scores across the constructs with respect to levels of DT. Table 14 presents the mean scores and standard deviations referred to in the post hoc comparison. The table shows that companies with a high DT level reflected the highest means scores on all categories of SA, scope of DT, speed of DT and scale of DT. On the other end of the spectrum, companies with low DT reflected the lowest mean values for the same categories.

Table 14: Descriptive statistics of each construct per level of DT

		N	Mean	Std. Deviation
Strategic Agility	Low DT	26	4.7788	1.24765
	Medium DT	34	5.3015	0.93497
	High DT	30	5.4583	0.91699
	Total	90	5.2028	1.05528
Scope of Digital Transformation	Low DT	26	4.8077	1.20064
	Medium DT	34	5.6078	0.97949
	High DT	30	6.0111	0.77550
	Total	90	5.5111	1.09042
Speed of Digital Transformation	Low DT	26	4.3590	1.38539
	Medium DT	34	5.3333	1.11010
	High DT	30	6.0778	1.00452
	Total	90	5.3000	1.33712
Scale of Digital Transformation	Low DT	26	4.9231	1.17873
	Medium DT	34	5.3137	1.06027
	High DT	30	5.6333	0.88560
	Total	90	5.3074	1.06848

Post hoc comparison for strategic agility

Post hoc comparison using the Tukey HSD test (at a 0.05 level of significance) indicated that the mean score for companies with low DT (M = 4.78, SD = 1.25) was not significantly different from the score for companies with medium levels of DT (M = 5.30, SD = 0.93). The test further indicated that the mean score for respondents from companies with high levels of DT (M = 5.46, SD = 0.92) was significantly different from that of companies with low levels of DT, while simultaneously remaining insignificantly different from scores of respondents from companies with medium levels of DT. Table 15 summarises the test findings. In this table, means within single groups or columns were not significantly different, while means in different columns (column 1 vs column 2) were found to be significantly different.

Table 15: Homogeneous subsets for strategic agility

DT Level	N	Subset for alpha = 0.05	
		1	2
Low DT	26	4.7788	
Medium DT	34	5.3015	5.3015
High DT	30		5.4583
Sig.		0.130	0.828

Post hoc comparison for scope of digital transformation

Post hoc comparison using the Tukey HSD test (at a 0.05 level of significance) indicated that the mean score for low levels DT (*M* = 4.81, *SD* = 1.20) was significantly different from the scores for companies with medium levels of DT (*M* = 5.61, *SD* = 0.98) and high levels of DT (*M* = 6.01, *SD* = 0.78). Mean scores of companies with medium levels of DT were, however, not found to be significantly different from mean scores of companies with high levels of DT (Table 16).

Table 16: Homogeneous subsets for scope of digital transformation

DT Level	N	Subset for alpha = 0.05	
		1	2
Low DT	26	4.8077	
Medium DT	34		5.6078
High DT	30		6.0111
Sig.		1.000	0.264

Post hoc comparison for scale of digital transformation

Post hoc comparison using the Tukey HSD test (at a 0.05 level of significance) indicated that the mean score for companies with low DT (*M* = 4.92, *SD* = 1.18) was not significantly different from the score for companies with medium levels of DT (*M* = 5.31, *SD* = 1.06). The test further indicated that the mean score from companies with high levels of DT (*M* = 5.63, *SD* = 0.89) was significantly different from that of companies with low levels of DT, while simultaneously remaining insignificantly different from the mean score of companies with medium levels of DT. Table 17 summarises the findings of this comparison.

Table 17: Homogeneous subsets for scale of digital transformation

DT Level	N	Subset for alpha = 0.05	
		1	2
Low DT	26	4.9231	
Medium DT	34	5.3137	5.3137
High DT	30		5.6333
Sig.		0.324	0.468

Post hoc comparison for speed of digital transformation

Post hoc comparison using the Tukey HSD test (at a 0.05 level of significance) indicated that the mean scores for companies with low levels DT (*M* = 4.36, *SD* = 1.39), medium levels of DT (*M* = 5.33, *SD* = 1.11) and high levels of DT(*M* = 6.08, *SD* = 1.00) were significantly different from each other. This is indicated by the three subset columns in Table 18.

Table 18: Homogeneous subsets for speed of digital transformation

DT Level	N	Subset for alpha = 0.05		
		1	2	3
Low DT	26	4.3590		
Medium DT	34		5.3333	
High DT	30			6.0778
Sig.		1.000	1.000	1.000

5.7 Assessment of research hypotheses

This section presents the results of the testing of four hypotheses of the study. The first subsection addresses the assessment of hypotheses one through three in order to establish the direction and strength of the relationship between DT and SA. With the nature of the relationship established, the subsequent subsection addresses the development of a multiple linear regression model which reflects the combined effect of the components of DT on SA.

5.7.1 Correlation of research constructs

H_1: there is a significant relationship between the scope of digital transformation and strategic agility

H_0: there is no significant relationship between the scope of digital transformation and strategic agility

A bivariate Pearson's correlation analysis was conducted to assess the relationship between the scope of DT and SA. A moderate positive correlation was observed between the two, and the correlation was found to be statistically significant, with r (87) = 0.573 at the 0.01 level of significance. Spearman's correlation confirmed the correlation between the two factor constructs, with r_s (87) = 0.534 at the 0.01 level of significance. The correlation analysis data is summarised in Table 19.

Table 19: Bivariate correlation analysis of the scope of digital transformation and strategic agility

		Pearson's r		Spearman's rho	
		Strategic Agility	Scope of Digital Transformation	Strategic Agility	Scope of Digital Transformation
Strategic Agility	Correlation	1	.573**	1.000	.534**
	Sig. (2-tailed)		0.000		0.000
Scope of Digital Transformation	Correlation	.573**	1	.534**	1.000
	Sig. (2-tailed)	0.000		0.000	

H_2: there is a significant relationship between the scale of digital transformation and strategic agility

H_0: there is no significant relationship between the scale digital scale and digital transformation and strategic agility

A bivariate Pearson's correlation analysis was conducted to assess the relationship between the scale of DT and SA. A moderate positive correlation was observed between the two, and the correlation was found to be statistically significant, with r (87) = 0.573 at the 0.01 level of significance. Spearman's correlation confirmed the correlation between the two factor constructs, with r_s (87) = 0.577 at the 0.01 level of significance. The correlation analysis data is summarised in Table 20.

Table 20: Bivariate correlation analysis of the scale of digital transformation and strategic agility

		Pearson's r		Spearman's rho	
		Strategic Agility	Scale of Digital Transformation	Strategic Agility	Scale of Digital Transformation
Strategic Agility	Correlation	1	.573**	1.000	.577**
	Sig. (2-tailed)		0.000		0.000
Scale of Digital Transformation	Correlation	.573**	1	.577**	1.000
	Sig. (2-tailed)	0.000		0.000	

H_3: there is a significant relationship between the speed of digital transformation and strategic agility

H_0: there is no significant relationship between the speed of digital transformation and strategic agility

A bivariate Pearson's correlation analysis was conducted to assess the relationship between the scope of DT and SA. A strong positive correlation was observed between the two, and the correlation was found to be statistically significant, with r (87) = 0.634 at the 0.01 level of significance. Spearman's correlation confirmed the correlation between the two factor constructs, with r_s (87) = 0.571 at the 0.01 level of significance. The correlation analysis data is summarised in Table 21.

Table 21: Bivariate correlation analysis of the speed of digital transformation and strategic agility

		Pearson's r		Spearman's rho	
		Strategic Agility	Speed of Digital Transformation	Strategic Agility	Speed of Digital Transformation
Strategic Agility	Correlation	1	.634**	1.000	.571**
	Sig. (2-tailed)		0.000		0.000
Speed of Digital Transformation	Correlation	.634**	1	.571**	1.000
	Sig. (2-tailed)	0.000		0.000	

5.7.2 Hierarchical multiple regression of research constructs

H_4: strategic agility is influenced collectively by the three components of digital transformation

H_0: strategic agility is not influenced collectively by the three components of digital transformation

Model 1 featured SA as the dependent variable and Speed of DT as the independent variable. A statistically significant regression model was obtained – F (1, 88) = 59.120, p = 0.000, with an R^2 value of 0.402. The individual regressor was found to be statistically significant – t (0.025, 88) = 3.722, p = 0.000, with a regression coefficient of 0.296 obtained. The regression product of Model 1 is summarised in Table 22 and detailed in Table 59 through Table 61.

Table 22: Regression Model 1 summary

Model	Model Summary			ANOVA				Coefficient Summary		
	R	R^2	ΔR^2	Reg	Res	F	p	β	t	p
1	0.634	0.402	0.402	1	88	59.120	0.000	0.500	7.689	0.000

Model 2 featured SA as the dependent variable, with Speed of DT and Scope of DT as the independent variables. A statistically significant regression model was obtained – F (2, 87) = 37.915, p = 0.000, with an R^2 value of 0.466. The individual regressors were found to be statistically significant – t (0.025, 87) = 4.731, p = 0.000; t (0.025, 87) = 3.224, p = 0.000 –, with regression coefficients of 0.359 and 0.300 obtained respectively. The regression outcome of Model 1 is summarised in Table 23 and detailed in Table 59 through Table 61.

Table 23: Regression Model 2 summary

Model	Model Summary			ANOVA				Coefficient Summary		
	R	R^2	ΔR^2	Reg	Res	F	p	β	t	p
2	0.682	0.466	0.064	2	87	37.915	0.000	0.359	4.731	0.000
								0.300	3.224	0.002

Model 3 featured SA as the dependent variable, with Speed of DT, Scope of DT and scale of DT as the independent variables. A statistically significant regression model was obtained – $F(3, 86) = 27.950$, $p = 0.000$, with an R^2 value of 0.494. The individual regressors were found to be statistically significant – $t(0.025, 86) = 3.722$, $p = 0.000$; $t(0.025, 86) = 2.195$, $p = 0.031$; $t(0.025, 86) = 2.180$, $p = 0.032$ –, with regression coefficients of 0.296, 0.217 and 0.220 obtained for Speed of DT, Scope of DT and scale of DT respectively. The regression outcome of Model 3 is summarised in Table 24 and detailed in Table 59 through Table 61. Partial plots of SA as a function of the respective elements of DT in Model 3 are shown in Figure 23 through Figure 25.

Table 24: Regression Model 3 summary

Model	Model Summary			ANOVA				Coefficient Summary		
	R	R^2	ΔR^2	Reg	Res	*F*	*p*	β	*t*	*p*
3	0.703	0.494	0.028	3	86	27.950	0.000	0.296	3.722	0.000
								0.217	2.195	0.031
								0.220	2.180	0.032

In summary, this section exhibited the results obtained by executing the methodology outlined in Section 4. The following section presents the assimilation and critical analysis of the results arrived at in Section 5, correlating these results and the assertions in the literature of Section 2.

6 ANALYSIS OF RESULTS

6.1 Introduction

The primary objective of this study was to investigate whether DT, as assessed through three components of speed, scope and scale, had a significant relationship with the perceived SA of businesses in a South African context. Perceptions of the constructs of the study were sought from management-level individuals regardless of what industries they represented, as what was of interest was the general attitude of these high-level individuals to the status of the relationship between the constructs in the context of this country as whole. This section presents an analysis of the pertinent results outlined in Section 5. Items discussed include the various demographic observations made, analysis of comparisons between groups, and the testing of the hypotheses set out for study.

6.2 Respondent participation

Based on comparable research to this study (Chen et al., 2014; Panda & Rath, 2015), the number of participants targeted was 320. The target was aligned with the aspiration to achieve at least 80 response cases from the target population, in accordance with the guidelines of Deutskens et al. (2004). Given the dual sampling method observed in the study design, the representation of purposively targeted individuals, 304 in total, was significant. The secondary snowball sampling method did not yield significant results as fewer than 10 suitable participants were referred to the researcher by purposively targeted individuals.

Numerous studies within the frame of this study's subject matter, such as Tallon & Pinsonneault (2011), Park et al. (2017), Panda & Rath (2015), Chen et al. (2014) and Lu & Ramamurthy (2011) – to name a few – reflected success with uni-channel modes of establishing contact with participants for data collection. This was not in line with the experience of the researcher as four channels were used to communicate the research intention and data collection request to targeted participants. Despite this multichannel operationalisation of the sampling method, only 107 responses were obtained. This, coupled with the feedback from some individuals who received the questionnaire, suggested that individuals might have been apprehensive of engaging with questioning that queried their position on DT. The observation highlighted the vast contextual difference between the current study's location and the countries or economies where the authors cited in the literature review conducted their studies; their studies were based

on countries such as the United States of America, Korea and China, where DT and discussions around its relationship with SA are apparently more mature than they are in South Africa.

6.3 Seniority demographics

Representation across the age ranges of respondents was considerably biased towards the younger ranges, with the highest representations in the ranges of 0 to 30 and 31 to 40. The expectation would, therefore, be that a positive inclination towards the existence of a significant relationship between DT and SA would be observed in the responses. This was the case with mean scores ranging between 5.30 and 5.51 for DT. The result was consistent with the findings of Fitzgerald et al. (2013) and Zain et al. (2005), which suggested that while higher levels of management characterised by older individuals may have a sturdier foundation in matters of strategy, lower levels of management typically populated by younger individuals tend to be more adept at and more inclined towards participation in matters of DT.

As introduced in Section 1 and Section 2, it is plausible that the disjointed view brought about by the different perceptions across the range of age and management seniority highlighted by Solis and Littleton (2017) and Zain et al. (2005) was at play in this research based on the data acquired. This warrants further data and a more focussed study into this phenomenon in order to uncover whether lower echelons of management can conclusively be labelled as the “engine-room” driving DT and the application of digital technology. The consistency between this study’s findings and those of the authors cited suggests that the efficacy of strategy and SA in the age of the DBS would benefit from the inclusion of lower and younger levels of management as key contributors in strategic conversations as opposed to limiting their involvement to its execution.

6.4 Tenure demographic

Respondent tenure was biased towards the lower durations, with more than 60% of respondents having recorded being with their current organisations for five years or fewer. Of that percentage, 26 respondents were in the age range of 0 to 30 years, while 24 were in the age range of 31 to 40 years. Furthermore, of the respondents who fell into the 0 to 5 year tenure bracket, 37 were from the lower hemisphere of management (lower and middle management) as compared to the 20 that were from the upper hemisphere (senior and executive managers). This further supports the inclination toward DT of

younger managers, who are typically in the lower strata of management, as mentioned above (Fitzgerald et al., 2013; Zain et al., 2005).

6.5 Company size demographic

In terms of company size representation, the data suggested that individuals from companies classified as large in terms of the National Small Business Amendment Act of 2003 introduced in Section 1.5 were most willing to participate in the query on DT. They were followed, at almost half of that representation, by representatives from small companies. Surprisingly, representation of middle size companies was significantly less than the other two categories. Despite this, the comparisons of means between the three groups were found to be statistically insignificant. This observation was inconsistent with the findings of Park et al. (2017), who suggested that large organisations should reflect significantly higher scores than their middle sized and smaller sized counterparts as they typically have more resources to direct towards enhancing their strategic capabilities using digital technology. It follows that apparent differences in company size representation did not significantly influence the overall perception of the relationship between DT and SA that the study was investigating in the South African context. As the study by Park et al. (2017) was conducted in Korea, a country that is by all accounts considerably more advanced than South Africa in matters of digital technology and DT, the difference observed stood as a one notable indicator of the differences in management level professionals' perceptions of the relationship between the constructs.

6.6 DT level demographic

An almost equal distribution was observed across the data set with respect to the level of DT of the companies reported. This was in contrast with the findings of Fitzgerald et al. (2014), as their study of 1559 companies across 106 countries revealed that 65% of the companies reporting had low levels of DT (and only 15% reported high levels of DT). Given that 66% of their responses came from executives in the United States of America, Canada, United Kingdom, Australia, Brazil and India, countries which have achieved reasonably more DT maturity than South Africa, it was interesting to observe the contrasting distribution in perceptions of DT maturity in this country. In comparing the figures above, it may be posited that this study's respondents' perceptions of DT maturity are not a true reflection of reality. It should, however, be kept in mind that the studies had vastly different sample sizes.

6.7 DT controlled post hoc analysis

6.7.1 Strategic agility

As the analysis of variance of means between groups based on DT levels highlighted the existence of a potentially significant difference between the groups, post hoc analysis allowed for greater assimilation of the data to reveal where the differences were. When queried about their perception of the state of SA in their organisations, individuals from companies that had low levels of DT reflected scores that were significantly different, and lower, than companies with high levels of DT. This suggested that respondents from companies with lower levels of DT were less in agreement that their companies were strategically agile. While companies with medium levels of DT showed the highest representation at 37%, they were not homogeneous in their perception of their firms' SA. Table 15 in Section 5 suggests that some of these respondents perceived their companies to be strategically agile, while others perceived significantly less strategic agility than their medium DT level counterparts.

6.7.2 Scale of digital transformation

A similar pattern of opinion to the above was observed in the post hoc comparison of the scale of DT based on companies' DT levels. Individuals from companies reported to have lower levels of DT were less in agreement on the existence of a relationship between the scale of DT and SA, while those reported to have high levels of DT were more in agreement on the existence of a relationship between the constructs. Individuals from firms with medium levels of DT straddled the spectrum of agreement on the existence of a relationship between scale of DT and SA, suggesting that some respondents were more in agreement that there is a significant relationship between the constructs and others were less. Contrary to the findings of Tallon and Pinsonneault (2011), as well as Weill et al. (2002), the data pointed to the fact that individuals from firms with higher scales of DT also concluded that their organisations were more strategically agile and vice versa. This conclusion is supported by the partial plot of SA as a function of the Scale of DT shown in Figure 9, which shows a positive correlation between the two variables, as well as a fairly tight grouping of the data points about the line of best fit.

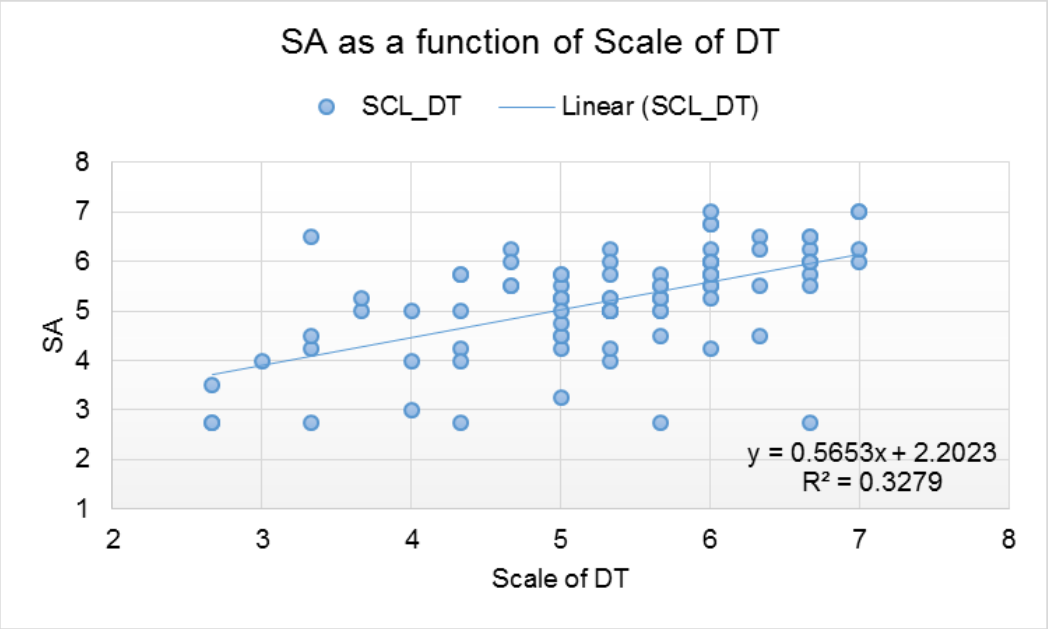

Figure 9: Partial plot of SA as a function of Scale of DT

6.7.3 Scope of digital transformation

The difference in the means of firms with medium and high levels of DT was statistically insignificant in the post hoc comparison of groups based on the scope of DT (Table 16 in Section 5). This suggested that individuals from companies with those levels of DT were similarly in stronger agreement on the existence of a relationship between the scope of DT and SA. On the other hand, respondents from companies with lower levels of DT were less in agreement on the existence of a relationship between the two constructs. The statistical insignificance observed between companies with medium to high levels of DT was in concert with the verdict of Sebastian et al. (2017), who suggested that there was a snowballing effect to the scope of DT. The achievement of a threshold level of level of DT serves as a foundation for the growth of DT scope in a seemingly self-catalytic fashion (Sebastian et al., 2017). This concept is evident in Figure 10. In this figure, it is apparent that at a lower DT scope level, the spread of data points is wider, and as the scope of DT increases, the grouping of data points abruptly becomes more dense. While the breaking point of the threshold of inertia probably varies based on a collection of factors, what is clear is that as organisations gain momentum with the growth of the scope of their DT, they see greater benefits in their achievement of SA.

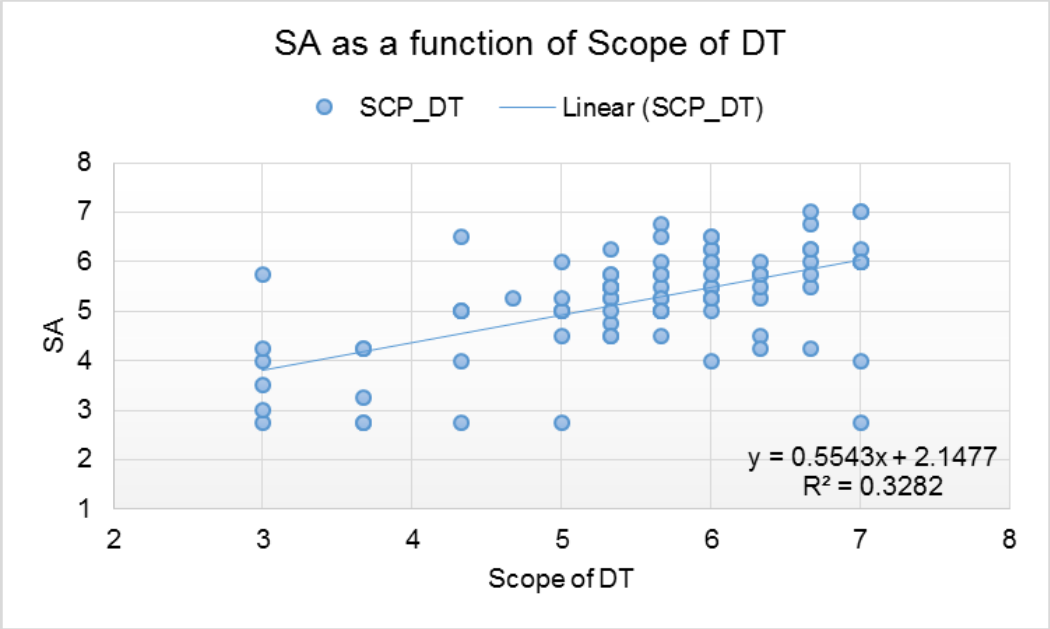

Figure 10: Partial plot of SA as a function of Scope of DT

6.7.4 Speed of digital transformation

The final post hoc comparison of means concerned the speed of DT. In this case, the data reflected three distinct levels of acknowledgement of the existence of a relationship between the speed of DT and SA (Table 18 in Section 5). Individuals from companies that were reported as having a high level of DT reflected the strongest agreement on the existence of a relationship between the speed of DT and SA, while individuals from companies that were reported to have low levels of DT were almost neutral in their opinion as to whether the two constructs had a relationship. Respondents from companies classified as having achieved a medium level of DT showed a moderate level of agreement that there was a relationship between the constructs. In comparison to Figure 9 and Figure 10, the improved uniformity of the distribution of data points in the graph of Figure 11 is representative of the existence of the three statistically significant groupings mentioned.

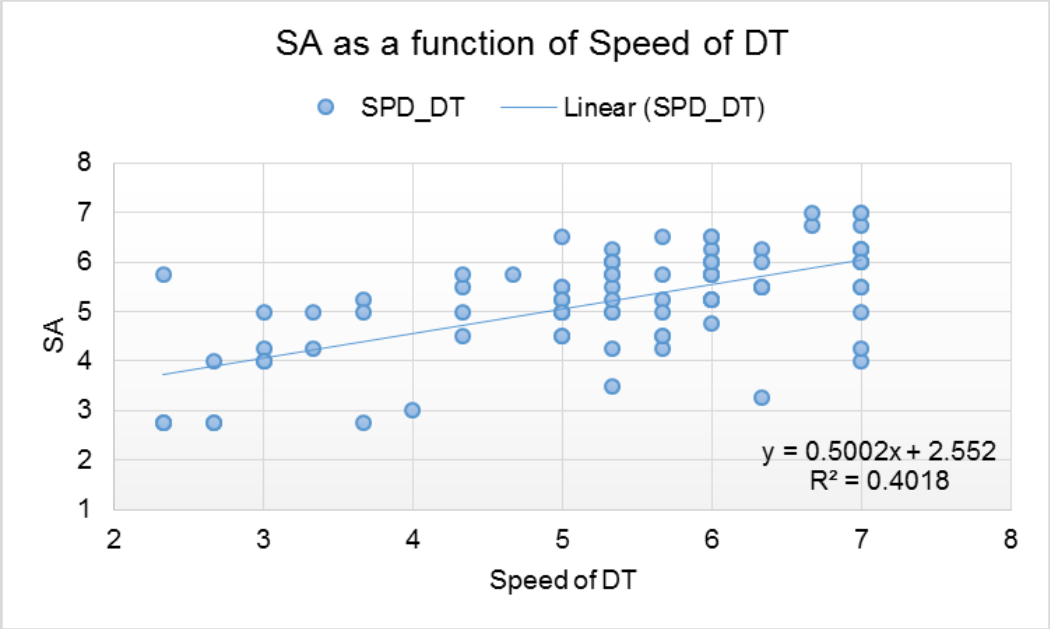

Figure 11: Partial plot of SA as a function of Speed of DT

Channelling the assertions of Bharadwaj et al. (2013), the impact of the speed of DT is particularly pronounced in its compression of the hierarchical layers and operational process flows traversed during decision-making processes in organisations. As such, this study found in favour of the presence of an interdependence between increased SA and increased speed of DT. Furthermore, inferences drawn from the observed outcome support the conclusion of Setia et al. (2013), who suggest that increasing levels of speed of DT in firms is co-dependent with increasing SA as such transformation provides the firms in question with superior capabilities to deliver value to their clients. The mechanism through which these capabilities are operationalised is through the enhancement of the firms' sense and response functions, as introduced by Setia et al. (2013) and Teece et al. (2016) in Section 2.

6.8 Testing of hypotheses

Several hypotheses were conceptualised using literature as a source of inputs. Within these hypotheses, the individual components of DT were assessed for their respective degrees of relation with SA, allowing the significance and direction of each pairwise relationship assessment to be understood on its own merits. Hypothesis one posited the existence of a significant relationship between the scope of DT and SA; Hypothesis 2 posited the existence of a significant relationship between the scale of DT and SA; and Hypothesis three posited the existence of a significant relationship between the speed

of DT and SA. With the nature and significance of each of these hypothesised relationships understood, Hypothesis four concerns the net effect of the three components of DT on SA, positing that the three first level components of DT have a significant cumulative base as predictors of SA in the context of South African business.

6.8.1 The relationship between the scope of digital transformation and strategic agility

H_1: there is a significant relationship between the scope of digital transformation and strategic agility

H_0: there is no significant relationship between the scope of digital transformation and strategic agility

The first hypothesis posited that there was a significant relationship between the scope of DT and SA. Based on the data collected in this study, a moderately strong positive Pearson's correlation of r (87) = 0.573 was observed between the two constructs. The correlation was found to be significant at 0.01 level of significance, thereby providing statistical evidence within the context of this research that there was co-variability that could reasonably be approximated by a straight line relationship. In essence, as the scope of DT increases, the degree of SA is perceived to increase as well (and vice versa). It was therefore concluded that there was insufficient evidence to reject the null hypothesis (**H_1**) in favour of the alternate hypothesis (**H_0**).

Krotov et al. (2015) concluded that despite the existence of technical limitations surrounding the scope DT, which they term as "ubiquity", the evidence pointing to its contribution to SA is clear and well developed. While they found varying degrees of impact of scope of DT on agility depending on the type of services that the organisations investigated provided, their findings indicated that "organisations can achieve a faster and more effective response to new developments in the internal and external environment" by improving the scope of DT across the organisation (Krotov et al., 2015, p. 14).

The observed positive correlation between the scope of DT and SA also supports the assertion of Berman (2012) that coverage of scope across the organisation allows for

greater ease of leveraging of information and relationships across the various structures of the organisation and its operating channels. The result is the enhanced ability of the organisation to deliver on its strategic mandate by altering its operational capabilities to meet market needs.

Furthermore, Setia et al. (2013) observed that the effective scope of DT across a firm had a direct bearing on the coverage of its strategic focus. This implies that organisations that extend the scope of their DT to include all aspects of their business are able to configure all of its components into alignment with the sway of corporate strategy. Given the level of unification that would be in place in such cases, induction of strategic agility would be achievable at an almost finite level across the organisation. In contrast to the findings of previous research, Setia et al. (2013) argue in concert with the finding of this study that narrowing the scope of DT would result in localised capabilities, effectively diminishing the ability of the organisation to be strategically agile.

A final parallel to this study was drawn by Chen et al. (2014), who added that while their findings supported the significance of scope in the enablement of SA in organisations, scope of DT should be extended to include the equipment of the personnel operating the on-boarded digital technology with equally advanced skill sets. While this was not explicitly assessed in this study, the argument of Chen et al. (2014) resonates with the fundamental concepts that were under investigation as the notion of technology extends beyond hardware and software to include know-how. Though South Africa is perceptibly striding ahead of most of its fellow continental nations with respect to DT, it remains significantly overshadowed by the state of economy-wide DT in developed countries. The findings of this study and the case advanced by Chen et al. (2014) lay the foundation for a closer look at how South Africa is going to circumvent the effects of DT “fatigue” (Fitzgerald et al., 2014). In order to attain the strategic imperative of agility, the local business community will be continuously stretched to reach for the latest digital technology in a bid to become and remain globally competitive. Managing that fatigue is therefore deserving of diligent attention.

6.8.2 The relationship between the scale of digital transformation and strategic agility

H_2: there is a significant relationship between the scale of digital transformation and strategic agility

H_0: there is no significant relationship between the scale digital scale and digital transformation and strategic agility

The second hypothesis posited that there was a significant relationship between the scale of DT and SA. Similar to the hypothesis concerning the scope of DT, a moderately strong positive correlation of r (87) = 0.573 was observed between the two constructs. The correlation was found to be significant at 0.01 level of significance, thereby providing statistical evidence within the context of this research that there is covariance that can reasonably be approximated by a straight-line relationship. It was therefore concluded that there was insufficient evidence to reject the null hypothesis (**H_2**) in favour of the alternate hypothesis (**H_0**).

Lu and Ramamurthy (2011) found a similar outcome to this study, having predicted that there was a positive relationship between the constructs based on their extensive literature search. In the case of this study, the direction of the relationship was left to the control of the data collected. While the volume of research on the subject in the American context provided a foundation for the prediction of the nature of the relationship in the study by Lu and Ramamurthy (2011), this is not the case in the South African context.

Contrary to the findings of this study, Weill et al. (2002) believed that pursuing a large scale of DT did not necessarily translate to agility. In testing the position of Weill et al. (2002), Tallon and Pinsonneault (2011) concluded that scale of DT did in fact support the improvement of SA. Their research went as far as asserting that the impact of scale in particular was that it improved the sensing function of organisations, allowing them to be better positioned to sense market threats and opportunities. They added that the enhancement of flexibility or adaptability with scale, which was also tested in this study, bolstered the response capability of organisations; it supported the improvement of speed and dexterity in the response capability of the organisations researched.

While there was consensus between the findings of Lu and Ramamurthy (2011) and those of this study, the authors added that their research highlighted the potential for

diminishing returns in agility if scaling of DT was not preceded by a clear understanding of how DT was intended to improve strategic capabilities. Although the scope of the data and statistical tests in this research did not permit the testing of this finding in the South African context, it was worthwhile noting as a point of caution for local business intent on investing in scaling DT in their organisations in the quest to build or improve SA.

6.8.3 The relationship between the scale of digital transformation and strategic agility

H_3: there is a significant relationship between the speed of digital transformation and strategic agility

H_0: there is no significant relationship between the speed of digital transformation and strategic agility

The third hypothesis posited that there was a significant relationship between the speed of DT and SA. A stronger positive correlation (than that observed in the two preceding two hypothesis discussions) of r (87) = 0.634 was observed between the speed of DT and SA. The correlation was found to be significant at 0.01 level of significance, thereby providing statistical evidence within the context of this research that there is covariance that can reasonably be approximated by a straight line relationship. It was therefore concluded that there was insufficient evidence to reject the null hypothesis (**H_3**) in favour of the alternate hypothesis (**H_0**).

In the empirical study conducted by Park et al. (2017), different configurations of elements were tested for the degree to which they influenced the agility of organisations. The speed of DT-related elements featured consistently across all configurations of their analysis as a factor of influence on SA. Their findings were, however, contrary to those of this research in that while the speed of DT showed the strongest correlation with SA amongst the components of DT considered herein, it featured as a peripheral element in the study by Park et al. (2017).

Furthering the contrast between the findings of the two studies, Park et al. (2017) found that the technologically transformative effects on agility were more effective and more relevant in large organisations than in small organisations. In this research, comparisons

of scores between the different sizes of companies were found to be statistically insignificant, as mentioned in Section 5.6.2. The authors attribute this difference between large and small organisations to the fact that large organisations have more resources and therefore the critical mass to break transformative inertia. They propose that this allows larger companies to achieve more control of sensing and responding capabilities, which effectively translates to greater SA. This suggests that there are possibly other factors at play in the South African context that nullify the effect of company size and the associated resource disparity between companies of different sizes. Given the scope and explanatory nature of this study, an exploratory investigation into the factors moderating the relationship between speed of DT and SA, concerning company size in particular, is warranted. As this was the strongest correlation between the components of DT and SA, understanding the intricacies and causalities between the speed of DT and SA in the context of this business environment would be of great importance to the digital and strategic future of the country.

6.8.4 The cumulative effects of digital transformation on strategic agility

H_4: strategic agility is influenced collectively by the three components of digital transformation

H_0: strategic agility is not influenced collectively by the three components of digital transformation

In the previous three subsections, it was established that there was a significant positive relationship between the three components of DT and SA. In all three cases, the relationship was established at a strict level of significance of 0.01. This meant that there was a 99% chance that the propositions made in the three preceding hypothesis would hold true in the context of the study. Having established the above, it was sought by means of multiple linear regression to establish the degree to which DT (as the independent variable) could be used to predict the behaviour of SA (the dependent variable).

The layered approach to multiple linear regression allowed for the influence of each of the independent variable components to be identified. Model 1, which included the speed of DT as the only independent variable, showed that not only was the speed of DT a

significant predictor of the SA, but it also explained 40.2% of the variance observed in SA. This outcome further reinforced the contrast between the findings of this study and those of Park et al. (2017), as a 40.2% explanatory power contradicts the observation that speed of DT is a peripheral item as a predictor of SA, particularly in the South African context.

Model 2 considered the combined effect of the speed of DT and the added variable of the scope of DT. The addition of the second variable to the model yielded an increase of 6.4% in the explanatory power of the behaviour of SA. While this increase, represented by the ΔR^2 figure in Table 23, appears small in relation to the 40.2% observed in the case of speed of DT in Model 1, the scope of DT was determined to be a statistically significant contributor to the predictive power of the model. The statistical significance of the scope of DT in the model in this research supports the case of Tallon and Pinsonneault (2011) as discussed in Section 6.8.2. This study further ascribes a quantity that serves as an empirical indicator of the perceived contribution of scope of DT to the prediction of SA in the South African context.

The final model, Model 3, was inclusive of all three components of DT. The inclusion of the scale of DT in the model increased the predictive power of the model by 2.8%. The total explanation of the behaviour of SA in relation to the combined effect of the components of DT amounted to 49.4%, as indicated by the ΔR^2 value in Table 24. Despite the modesty of the contribution of the scale of DT to the predictive power of the model, it was found to be a statistically significant independent variable. Overall, it was concluded that there was insufficient evidence to reject the null hypothesis ($\mathbf{H_4}$) in favour of the alternate hypothesis ($\mathbf{H_0}$). SA could therefore be expressed as a function of functions of DT as follows:

$$SA = 0.296 \times SPD + 0.217 \times SCP + 0.220 \times SCL + 1.272$$

Partial regression plots of the model plotted are shown in Figure 23 through Figure 25.

Taken collectively, the attainment of a statistically significant model with representations of all three independent variable components indicates that the model conceptualised from the work of Bharadwaj et al. (2013) has practical relevance even in the context of a developing economy environment like South Africa. While differing degrees of the importance of the components of DT have been indicated by the results of this study in comparison to other research (Tallon & Pinsonneault, 2011; Park et al., 2017; Lu &

Ramamurthy, 2011; Weill et al., 2002; Krotov et al., 2015; Chen et al., 2014), the findings shine light on the perceptions of management representatives in the population sample regarding the influence of the components of DT in the SA of companies in a South African setting. Figure 12 presents the tested theoretical model. The arrows and plus signs added to the hypothesis model featured in Section 3 indicate the directions and nature of the relationships established in the analysis conducted in this research.

The next Section concludes the proceedings of this study. It summarises the outcomes of the research and substantiates how the outcomes add value to the body of knowledge as briefly referred to in Sections 1.3 and 1.4.

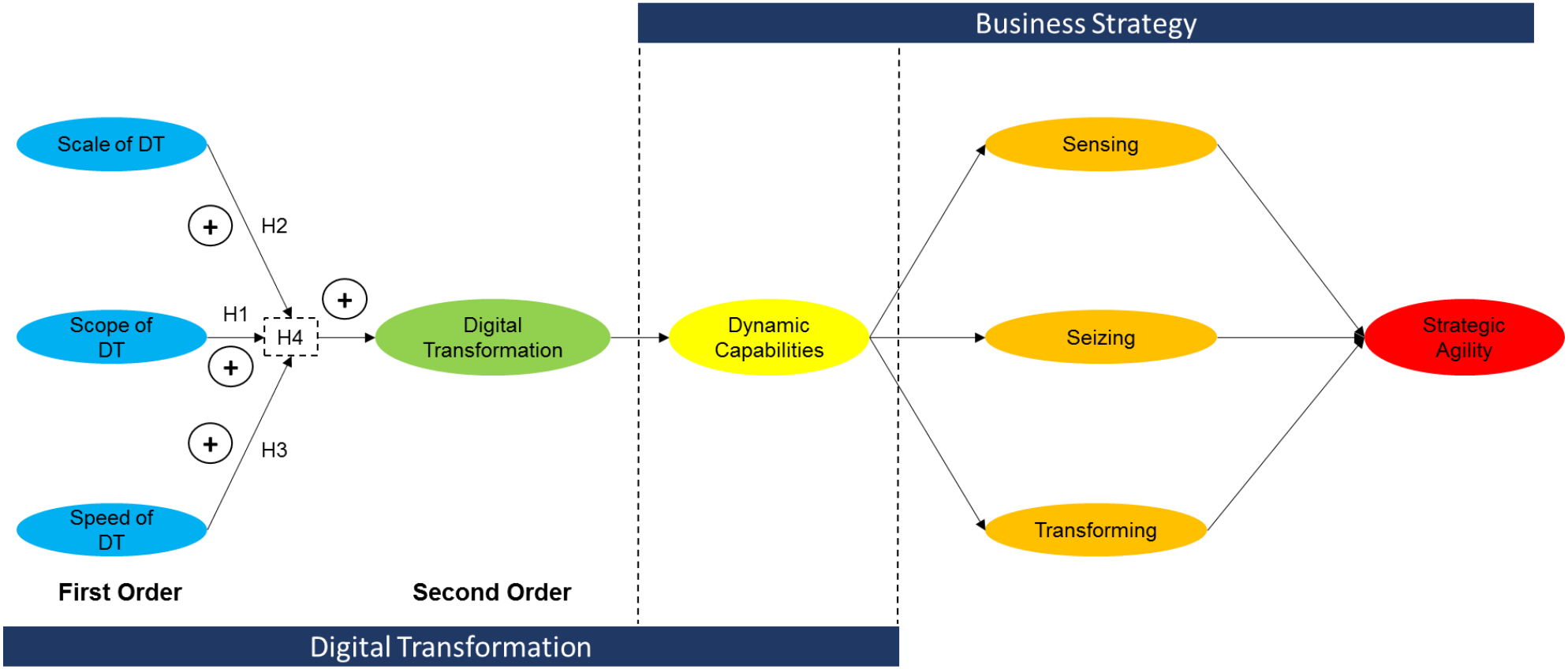

Figure 12: Post hypothesis testing model

7 CONCLUSION

This section rounds up the principal findings of the research on the relationship between DT and SA. Implications of the research in terms of its contribution to academia and the practical world of business will be discussed. Recommendations for further research that could build on the foundation of this study will then be proposed.

7.1 Principal findings

The research set out to investigate the nature of the relationship between DT and SA. As such the objective was to assess whether speed, scope and scale of DT (Bharadwaj et al., 2013) had a significant relationship with SA. While the fundamentals of these components of DT have been tested in varying combinations and degrees of granularity in the United State of America, Korea and Malaysia, there was still an opportunity to assess their position as enhancers of dynamic capabilities that support SA in a South Africa context (Zain et al., 2005; Park et al., 2017; Lu & Ramamurthy, 2011). Furthermore, the influence of each of the components of DT and their combination towards SA in the context of this country had yet to be investigated. Target participants, whose perceptions of the status of the constructs of the study were sought, comprised management level individuals, as these typically engage with matters of strategy development, execution and realignment in response to the business environment.

The first principal finding uncovered by the study was that according to categorical classification of the data, companies ranked as having low levels of DT were significantly less strategically agile than companies classified as having attained high levels of DT. This was consistent with the literature on similar studies conducted on the subjects of DT and SA (Park et al., 2017; Chen et al., 2014; Tallon & Pinsonneault, 2011). Companies classified as falling into the medium DT category presented dual characteristics, with some classed as having high levels of SA and others as having low levels of DT.

The second principal finding was that cognisance of the presence of a link between scope of DT and SA within companies was nuanced. Companies displayed varying levels of recognition of the existence of a relationship between the three components of DT and SA based on the level of DT that they themselves had attained. While the opposite sides of the spectrum were consistently occupied by the high and low DT level companies, those with medium levels of DT fell towards different sides of the spectrum

in different instances. They were even represented on both sides of the spectrum in some cases.

The third significant finding of the research was that all three components of DT as per the theorised model of Bharadwaj et al. (2013) – scope, scale and speed – have a statistically significant relationship with SA. This relationship was classified as moderate to moderately strong across the three elements of DT.

The final principal finding was that the three components of DT have a statistically significant cumulative effect on SA. This cumulative effect was modelled using a multiple linear regression, with SA as the dependent variable and the components of DT as the independent variables. Highlighted by this model was the fact that speed of DT accounted for the bulk of variance in the relationship between the DT and SA. While they accounted for smaller portions of the variance, scope of DT and scale of DT were also found to be statistically significant contributors to the overall model.

7.2 Implications of the research for business

The literature and discussions advanced in this study point emphatically to the trend of the increasing pace of change in the business environment, as well as the tensions that the change places on organisations' competitive ability. While the cost of digital technology was an impediment to its widespread adoption in organisations, its increasing ubiquity and the associated effect of declining costs of adoption support its elevation from an IT speciality into a corporate strategy interest. Although the infusion of digital technology into the "DNA" of organisations can improve operational efficiency and business model efficacy, its ability to improve organisations' SA remains open to debate.

Building upon the foundation of the above preamble, the findings of the research inform organisations of the asymmetric spread of returns (of improvements in dynamic capabilities and therefore SA) that are to be expected from investing in DT. For example, a firm that aspires to improve its SA in order to remain competitively relevant may naturally be faced with the debate of how far spread across the organisation DT should be (i.e. scope); how large the investment commitment at each touch point of transformation should be (i.e. scale); and how expedited a transformation on sense and response accelerating capabilities the endeavour should be (i.e. speed). The findings of this research suggest that given limited resources, such a company would do well to focus on improving the speed of DT rather than the other two components for the maximum impact on SA. An incremental approach can then be taken to rolling out the

other two components of DT in their organisation in combinations that create synergistically enhanced improvements to the DC and SA of the organisation.

While the exact nature of the DT entered into will vary according to a firm's industry, operational environment, and strategic trajectory, DT will be most effective if prioritised in the following order: speed of DT, scope of DT and lastly scale of DT. The proposed mechanism of action for business based on the findings of this research is presented in Figure 13. At state 1, the business would take an inventory of the external and internal business environments as seen through the lens of its strategic interface. This would include a critical assessment of the DT needs of the firm and the desired SA characterised by the DC of sensing, responding and transforming. The interface can be thought of as the firm's plane of contact with the external environment that allows it to take stock of its internal business activities in correlation with the external business environment.

Having established its DT and SA needs, the organisation would proceed to effecting the desired DT iteratively through effecting states 2 to 4. With each step, the influence on SA observed by the firm would be reviewed, with observations fed into the next cycle back at state 1. The direction of the arrows and the emboldened "*t*" in Figure 13 emphasize the continuous nature of this process along the time continuum. This is commensurate with the dynamic nature of the external business environment that the firm would be faced with.

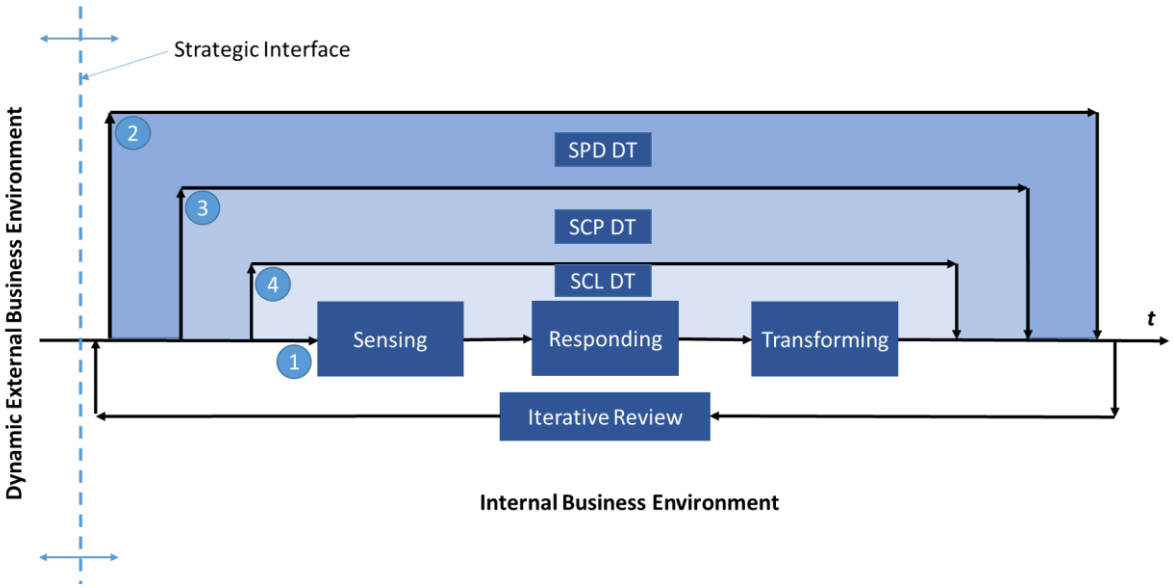

Figure 13: Iterative DT application model

The lean approach described above will in the first instance improve the ability of organisations to observe the stepwise effect of their DT investment and speedily take corrective action if so mandated by the sensed response to the environment. It will also make it easier for managers to motivate for DT capital as the correlation between smaller incremental investments in DT and the observed changes in SA will provide an empirical basis from which to lobby for increasing the scope and scale of DT across the organisation.

7.3 Implications of the findings for academia

This research contributes to the academic theory of business through the reification of an adapted theoretical mode conceptualised by Bharadwaj et al. (2013) that theorised that the three components of DT (ie. scale, scope and speed) were significant contributors to the SA of organisations in the modern economy. Above and beyond proving that there is indeed a relationship between the theorised components of DT and SA, the direction and strength of the relationship between the respective components and SA, which was not described in the work of Bharadwaj et al. (2013), was also established. This means that organisations can use this model to anticipate changes in their SA in response to targeted investments in DT.

If one imagines a firm navigating the external business environment according to a chosen strategic trajectory as shown in Figure 14, the primary impact zone for strategic decision-making is the immediate internal business environment, which includes resources, structures and operations. The secondary impact zone includes stakeholders immediately affected by the organisation's strategic decisions such as suppliers, the business network and the community. The transformation zone is the strategic nerve centre of the organisation, where it acquires, assimilates and acts on information gathered from the environment. Given the findings of this research, it can be further theorised that as an organisation becomes more digitally transformed, the components of DT serve to narrow the width of the transformation zone, thereby increasing the intimacy and alignment between the external business environment and the internal workings of the firm. This ability to alter the alignment between the external environment and the business, while maintaining the course of the overall chosen strategic trajectory, is representative of the role of DT in SA.

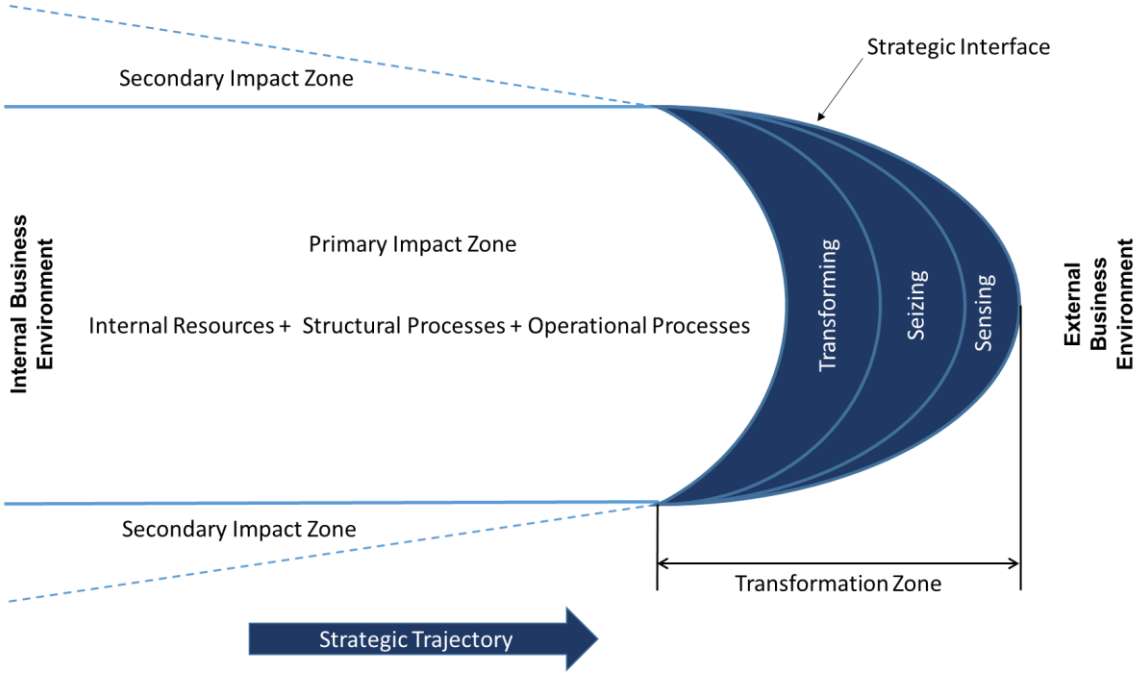

Figure 14: Theoretical concept implied by the relationship between SA and DT

The research also contributed to theory by highlighting that the relationships between the respective components of DT and SA are asymmetrical. While it may be desirable and simpler to overhaul the internals of an organisation by using a broad brush approach, this research has suggested the existence of diminishing returns in the effect on SA as the different types of DT are effected.

A further contribution of the research was that the three components of DT that were modelled accounted for almost 50% of the enhancement in SA in the organisations that were represented. This was important because it implies that there are other components of DT that account for the balance of the explanatory power of the model of the DT-SA relationship. This sets a foundation for further investigation, discussion and testing of other potential elements of DT that could build upon the understanding of the aforementioned relationship provided by this research.

There are dissimilarities between the literature and this study on the importance placed on specific aspects of DT in relation to its effect on SA. This is attributable, in part, to the fact that much of the literature on the constructs is rooted in economies and business environments that are significantly more advanced in their DT than is the case in the location of this study. This research thus contributes a perspective of DC and SA (and how they relate to DT) in an economic and environmental setting with markedly lower

DT proliferation and maturity than the Western and Asian locations mentioned in brief in the document.

7.4 Limitations of the research

Some factors that may have affected the execution of the methodology of the research were discussed in Section 4.13. Further limitations on the overall execution of the research were identified and are briefly discussed as follows:

Bias: a degree of bias was observed in the study because the majority of observed participants were from lower to mid management. Given that the researcher did not intentionally target lower bands of management for participation in the study, this meant that fewer senior level managers accepted the invitation to participate in the data collection process. As a result, the opinions gathered on the relationship between the constructs were more weighted towards the middle to lower tiers of management. Given more time, the author of this research believes the study would have benefited from more representation from senior and executive level managers.

Distribution: the distribution of the questionnaire via electronic channels meant that there was limited opportunity to elaborate on elements that participants needed clarification on. Some instances were observed where respondents communicated to the researcher that they were not clear on how some questions of the data collection tool applied to their industries or occupations. This meant that such questions could have been left unanswered or that they were attempted in a manner that may not have been a true reflection of the respondent's opinion.

Complexity of subject matter: some members of the sample of target participants expressed that they could not relate to the constructs of the subject under investigation in the study. While this was surprising to the researcher as these participants were known to be of management level, it became apparent that not all individuals were au fait with what DT, or lack thereof, meant to their company and industry in the new economy.

Response rate: the secondary sampling method of snowballing was, according to the researcher, observed to have been relatively unsuccessful. Given the nature of the snowballing method, it was expected to contribute significantly to the number of total response cases observed. Instead, fewer than10% of the responses received were a product of this secondary approach. It is unclear what the cause of minimal contribution to the response rate was; however, the researcher postulates that subject complexity may have been an influencing factor.

Online activity trust issues: this was highlighted in the research by the reception of emails and messages from targeted participants known to the researcher questioning if indeed the request for participation in the study that they had received was legitimate. Having noticed that individuals were particularly wary of clicking on the hyperlink that would direct them to the questionnaire (for fear of phishing scams), the researcher attempted to circumvent their concern by coding buttons into the invitation email in a bid to do away with the unfavourable visual appearance of the hyperlink. This softened the reception of the invitation email, with some target participants requesting that it be resent to them after having discarded the initial emails for fear of untoward internet scams.

Factor analysis model optimisation: through the factor analysis process, it was established that cross associations were made by respondents between the items testing some of the components of DT and SA (for example the speed of DT and SA). Teece (2016) cautioned that there is often confusion between SA and terms erroneously substituted for DC such as speed and flexibility. Through optimisation of the model, items that were complicit to the observed collinearity were re-assigned or removed. The total number of items was, however, reduced considerably. The researcher was cautious not to eliminate too many items so as to avoid undermining the calculability of the model indices and validity measures.

7.5 Recommendations for further research

While this study has advanced the discussion of the interaction between DT and SA, the complexity of the business environment maintains a gap in the body of knowledge that raises further questions for research to answer. A few potential areas of interest emanating from this study are recommended as follows:

- The findings of this research provided a base of evidence in that there was indeed a significant interaction between the constructs investigated. It was, however, apparent that the three components of DT that were considered as dependent variables accounted for half of the dependence in the relationship of DT with SA. This suggests that these components were not exhaustive, and that there is room for further research to be conducted to account for the remaining variance in the relationships between the constructs. A possible element of interest would be to investigate how DT influences value creation and value capture as added DCs that enhance the SA of organisations. This element is well understood and has been explored extensively from a resource based point of view (Bharadwaj et al.,

2013); however, how it adds value to the strategic mandate of firms in the digital economy remains to be explored further.

- Furthermore, this study focused on the executable elements of the DT process without investigating the contribution of the accompanying human element. Fitzgerald et al. (2014), Long (2011), Park et al. (2017) and Panda and Rath (2016) discussed several factors surrounding the human aspect of DT that have an impact on the effectiveness of how DT relates to SA. Some of these include management and personnel's skill and effectiveness in acquiring personal digital capabilities, unity in the drive of management towards DT, legacy inertia (ie. "the way we have always done things here"), shared vision relating to DT, innovation and change fatigue and power and politics dynamics in organisations. Each of these human elements represent opportunities to advance the understanding of what makes up the remaining 50% of the variance explained in the relationship between DT and SA investigated in this study.
- It was suspected that the subject matter may have been presented in a form that was not equally transparent to all management levels, contrary to the researcher's assumption. While both DT and SA are universal concepts that are not specific to any particular industrial or economic sector, the researcher's experience in conducting this study was that some individuals were not able to identify their relevance in the contexts or disciplines within which they operated. To this end, further research would do well to pre-contextualise the constructs and concepts in line with specific industries. This could improve the rate of response in data collection and provide increased depth of understanding into the nuances of the relationship between the constructs in specific industries of interest beyond the broad foundation provided by this study.
- In the geographical setting within which the study was conducted, further research could also take a closer look at medium-sized companies. Analysis of variance highlighted several instances of inhomogeneity in the behaviour of medium-sized companies with parts of the group showing insignificant differences with large companies while simultaneously showing insignificant differences with small companies. This suggests the possible existence of moderating factors that influence the perception of the constructs by companies of medium size. As this size of enterprise forms an important part of the economic fabric of emerging markets, developing further understanding of how these companies approach DT as a lever for SA in the modern economy would be worthwhile.

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9 APPENDICES

9.1 Questionnaire

Consent Statement

I am conducting research on the influence of digital transformation on strategic agility. To that end, you are asked to look complete the following questionnaire on the subject. This will help us better understand how digital transformation affects strategic agility in the modern age, and should take no more than 20 minutes of your time. Your participation is voluntary, and you can withdraw at any time without penalty. Your participation is anonymous and only aggregated data will be reported. By completing the survey, you indicate that you voluntarily participate in this research. If you have any concerns, please contact my supervisor or me. Our details are provided below:

Researcher name: Gomotsegang Segaetsho

Email : 27258272@mygibs.co.za

Phone: 079 649 7052

Research Supervisor: Matthew Birtch

Email: birtchm@gibs.co.za

Phone: (011) 771 4000

Questions

- How old are you (Range in years [0 – 30], [31 -40], [41 – 50], [51 – 60], [61 or more])
- How long have you been with your company (Range in years [0 – 5], [6 – 10], [11 – 15], [15 or more])
- What is your designation level (Lower Management, Middle Management Senior Management)
- What is the size of your company ([Small [0-50 employees], Medium [51-200 employees], Large[201 or more employees])
- What is the level of digital transformation in your organisation (Low, Medium, High)

H_1: there is a significant relationship between the scope of digital transformation and strategic agility

Question 1: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

- Our degree of digital transformation has fused digital technology with strategy
- Through digital transformation, we have been able to exploit the extended business ecosystem
- Digital transformation has enabled our strategy to transcend functional and process silos
- Our digital transformation enables our strategy to be more adaptive to the our environment

H_2: there is a significant relationship between the scale of digital transformation and strategic agility

Question 2: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

- Our level of digital transformation allows us to scale resources up and down in support of dynamic strategic capabilities throughout the firm
- Digital transformation has enabled the leveraging of strategic networks and multisided platforms at all levels of the company
- Through digital transformation we can restructure work processes to leverage opportunities and circumvent risks in the environment
- It is clear how the depth and extent of digital transformation translates to strategic agility for the organisation

Question 3: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

Relative to other firms in our industry, our digital transformation management capability has enabled us to:

- Develop a clear vision on how digital transformation contributes to business value
- Integrate business strategic planning and digital transformation planning
- Facilitate functional area and general management's ability to understand the value of digital transformation investments
- Establish an effective and flexible digital transformation planning process

H_3: there is a significant relationship between the speed of digital transformation and strategic agility

Question 4: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

We maintain a proactive digital transformation stance by:

- Constantly keeping up with new relevant digital technology innovations
- Continuing to experiment with new digital technology as necessary
- Maintaining a climate that is supportive of trying out new ways using digital technology
- Constantly seeking new ways to enhance the effectiveness of our digital technology use

Question 5: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

Digital transformation in our organisation has sped up:

- How effectively new strategic directions launched
- Effective organisational learning for improving strategic decision making
- Effective organisational learning for improving action toward adaptation
- The formation of business networks that provide complementary agile capabilities
- The sense and respond cycle
- The responsiveness to social and environmental issues

H_4: strategic agility is influenced collectively by the components of digital transformation

Question 6: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

- Due to digital transformation, our organisation has a strong change capability
- Digital transformation has enabled the organisation to develop effective learning capabilities
- We have robust, effective and current innovation capabilities as a result of our digital transformation

Question 7: Likert Scale (Strongly disagree = 1; Strongly agree = 7)

Digital transformation has enabled us to capitalise on the market by:

- Enabling quick making and implementing of decisions in the face of market/customer changes
- Enabling us to constantly look for ways to reinvent/reengineer our organisation to serve our market better
- Enabling us to treat market related changes and apparent chaos as opportunities

9.2 Appendix B – Ethical Clearance

Gordon Institute of Business Science
University of Pretoria

09 October 2018

Segaetsho Gomotsegang

Dear Gomotsegang

Please be advised that your application for Ethical Clearance has been approved.

You are therefore allowed to continue collecting your data.

Please note that approval is granted based on the methodology and research instruments provided in the application. If there is any deviation change or addition to the research method or tools, a supplementary application for approval must be obtained

We wish you everything of the best for the rest of the project.

Kind Regards

GIBS MBA Research Ethical Clearance Committee

9.3 Appendix C – Data Preparation

9.3.1 Data collected

Table 25: Sample of raw data collected

1. In whic	2. How lo	3. What is	4. What is	5. What is	6. Our de	7. Throug	8. Digital	9. Our dig	10. Our le	11. Digita	12. Digita	13. Throu	14. It is cl	15. Relati	Integrate	Facilitate	Establish	16. We m	Continuin	Maintainir	Constantl	17. Digita	Effective	Effective	The form	The sens	The resp	18. Due t	19. Digita	20. We h	21. Digita	Enabling	Enabling
Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31	Q32	Q33	Q34
31-40	0 – 5	Middle M	Large [201	Medium	Strongly a	Strongly a	Strongly a	Strongly a	Agree	Agree	Agree	Agree	Agree	Strongly a	Agree	Somewha	Agree	Agree	Agree	Agree	Disagree	Somewha	Somewha	Agree	Agree	Agree	Agree	Somewha	Somewha	Somewha	Agree	Agree	Disagree
0 – 30	0 – 5	Lower Ma	Medium [	Low	Somewha	Somewha	Somewha	Somewha	Somewha	Strongly a	Somewha	Somewha	Somewha	Strongly D	Strongly D	Somewha	Somewha	Somewha	Disagree		Disagree	Somewha	Somewha	Disagree	Somewha	Disagree	Somewha	Disagree	Strongly a	Disagree	Somewha	Somewha	Disagree	Disagree
0 – 30	0 – 5	Middle M	Small [0-5	Medium	Agree	Somewha	Agree	Neither a	Agree	Somewha	Neither a	Somewha	Agree	Somewha	Somewha	Neither a	Somewha	Disagree	Somewha	Somewha	Somewha	Neither a	Neither a	Agree	Somewha	Agree	Somewha	Agree	Somewha	Neither a	Agree	Somewha	Agree
31-40	0 – 5	Middle M	Small [0-5	Low	Agree	Strongly a	Neither a	Strongly a	Agree	Agree	Agree	Agree	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Somewha	Agree	Strongly a	Agree	Somewha	Somewha	Agree	Agree
51 – 60	0 – 5	Executive	Small [0-5	Medium	Strongly a	Agree	Agree	Strongly a	Strongly a	Strongly a	Agree	Agree		Strongly a	Strongly a	Agree	Strongly a	Strongly a	Agree	Strongly a	Strongly a	Agree	Strongly a	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Agree	Strongly a	Strongly a	Strongly a
0 – 30	0 – 5	Lower Ma	Medium [	Low	Strongly D	Disagree	Neither a	Neither a	Somewha	Neither a	Neither a	Neither a	Somewha	Strongly D	Strongly D	Strongly D	Strongly D	Disagree	Somewha	Neither a	Neither a	Neither a	Neither a	Neither a	Neither a	Neither a	Neither a	Neither a	Disagree	Disagree	Disagree	Strongly D	Disagree
31-40	0 – 5	Lower Ma	Small [0-5	Medium																													
0 – 30	0 – 5	Middle M	Small [0-5	High	Agree	Strongly a	Agree	Strongly a	Somewha	Somewha	Agree	Somewha	Agree	Agree	Agree	Somewha	Agree	Agree	Agree	Agree	Strongly a	Somewha	Agree	Strongly a	Strongly a	Somewha	Disagree	Strongly a	Strongly a	Strongly a	Disagree	Strongly a	Disagree
31-40	6 – 10	Middle M	Large [201	Medium	Neither a	Agree	Neither a	Neither a	Neither a	Agree	Somewha	Strongly a	Agree	Somewha	Somewha	Agree	Agree	Somewha	Somewha	Somewha	Neither a	Strongly a	Agree	Agree	Neither a	Neither a	Somewha	Somewha	Neither a	Somewha	Neither a	Somewha	Somewha
31-40	0 – 5	Senior Ma	Large [201	Low	Somewha	Somewha	Somewha	Neither a	Somewha	Neither a	Neither a	Somewha	Strongly D	Somewha	Neither a	Somewha	Somewha	Disagree	Disagree	Somewha	Somewha	Neither a	Somewha	Neither a	Neither a	Somewha	Neither a	Neither a	Somewha	Somewha	Somewha	Somewha	Somewha
0 – 30	0 – 5	Lower Ma	Small [0-5	Low	Disagree	Disagree	Disagree	Disagree																									
0 – 30	0 – 5	Middle M	Small [0-5	Low	Somewha	Somewha	Somewha	Somewha	Disagree	Neither a	Somewha	Agree	Somewha	Somewha	Somewha	Neither a	Neither a	Somewha	Neither a	Somewha	Disagree	Somewha	Agree	Agree	Somewha	Neither a	Agree	Neither a	Somewha	Neither a	Neither a	Somewha	Somewha
31-40	6 – 10	Executive	Small [0-5	High	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Somewha	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Somewha	Agree	Agree	Agree	Neither a	Somewha	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a
0 – 30	0 – 5	Senior Ma	Small [0-5	High	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a
41 – 50	0 – 5	Executive	Small [0-5	Low	Agree	Agree	Somewha	Somewha	Somewha	Agree	Agree	Agree	Agree	Somewha	Agree	Agree	Agree	Somewha	Agree	Somewha	Somewha	Somewha	Somewha	Somewha	Agree	Somewha	Somewha	Somewha	Somewha	Disagree	Somewha	Somewha	Somewha
41 – 50	6 – 10	Middle M	Large [201	High	Agree	Agree	Agree	Agree	Agree	Strongly a	Agree	Somewha	Agree	Agree	Agree	Somewha	Agree	Somewha	Somewha	Somewha	Agree	Somewha	Agree	Somewha	Agree	Somewha	Somewha	Somewha	Somewha	Agree	Somewha	Somewha	Agree
0 – 30	0 – 5	Executive	Large [201	High	Strongly a	Strongly a	Agree	Agree	Strongly a	Somewha	Somewha	Neither a	Somewha	Neither a	Somewha	Agree	Somewha	Somewha	Agree	Somewha	Neither a	Somewha	Somewha	Somewha	Somewha	Somewha	Somewha	Agree	Disagree	Somewha	Somewha	Neither a	Disagree
51 – 60	0 – 5	Executive	Small [0-5	High	Strongly a	Strongly a	Strongly a	Somewha	Somewha	Strongly a	Neither a	Neither a	Neither a	Somewha	Strongly D	Somewha	Neither a	Neither a	Somewha	Strongly a	Strongly a	Neither a	Neither a	Somewha	Somewha	Neither a	Strongly a	Agree	Somewha	Strongly a	Strongly a	Neither a	Somewha
51 – 60	15 or more	Middle M	Small [0-5	Low	Disagree	Disagree	Disagree	Disagree	Agree	Agree	Agree	Agree	Strongly a	Disagree	Disagree	Disagree	Disagree	Somewha	Agree	Agree	Agree	Somewha	Disagree	Disagree	Agree	Agree	Agree	Somewha	Somewha	Somewha	Disagree	Somewha	Somewha
0 – 30	0 – 5	Middle M	Large [201	Low	Neither a	Somewha	Somewha	Somewhat agree																									
31-40	6 – 10	Senior Ma	Large [201	Medium	Agree	Agree	Neither a	Neither a	Agree	Agree	Somewha	Strongly a	Neither a	Neither a	Strongly a	Agree	Somewha	Somewha	Disagree	Agree	Agree	Strongly a	Agree	Somewha	Somewha	Neither a	Agree	Agree	Neither a	Disagree	Somewha	Disagree	Neither a
41 – 50	6 – 10	Middle M	Large [201	High	Agree	Agree	Agree	Agree	Agree	Agree	Strongly a	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Agree	Strongly a	Agree
31-40	0 – 5		Large [201	Medium	Neither a	Somewha	Strongly D	Somewhat disagree																									
31-40	0 – 5	Lower Ma	Large [201	Low	Agree	Agree	Agree	Agree	Somewha	Strongly a	Strongly a	Strongly a	Agree	Strongly a	Agree	Agree	Somewha	Agree	Somewha	Somewha	Agree	Agree	Agree	Agree	Agree	Agree	Strongly a	Agree	Agree	Agree	Agree	Agree	Strongly a
51 – 60	0 – 5	Executive	Large [201	Medium																													
51 – 60	0 – 5	Senior Ma	Large [201	Medium	Somewha	Neither a	Strongly D	Somewha	Agree	Somewha	Somewha	Somewha	Somewha	Somewha	Neither a	Somewha	Neither a	Neither a	Strongly a	Strongly a	Strongly a	Somewha	Somewha	Somewha	Somewha	Somewha	Somewha	Somewha	Neither a	Disagree	Somewha	Neither a	Disagree
31-40	0 – 5	Middle M	Small [0-5	Medium	Strongly a	Strongly a	Strongly a	Strongly a	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly agree																
0 – 30	0 – 5	Middle M	Large [201	High	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Strongly a	Somewha	Agree	Strongly a	Strongly a	Agree	Agree	Somewha	Strongly a	Strongly a	Strongly a	Agree
41 – 50	6 – 10	Middle M	Medium [	Medium	Somewha	Agree	Agree	Somewha	Strongly a	Agree	Agree	Strongly a	Agree	Agree	Somewha	Agree	Agree	Strongly a	Strongly a	Strongly a	Strongly a	Agree	Somewha	Agree	Agree	Strongly a	Somewha	Agree	Somewha	Agree	Agree	Agree	Strongly a

Table 26 is a sample of the data that was coded according to the code book in Table 27. The yellow highlighting denotes cases that were flagged as unusable due to excessive missing data. The “FALSE” term in some of the cells indicates that the questions were left unanswered in by the participant.

Table 26: Sample of coded data

9	13	18	23	25	7	7	7	7	7	6	6	6	6	6	7	6	5	6	6	6	6	6	6	6	6	6	3	3	3	6	6
8	13	17	22	24	5	5	5	5	5	5	7	5	5	5	1	1	3	3	5	2	FALSE	2	3	3	3	2	3	2	7	2	3	3	2
8	13	18	21	25	6	6	5	6	5	6	5	5	5	6	5	5	5	5	2	3	3	3	5	5	6	5	6	5	6	5	5	6	5
9	13	18	21	24	6	6	7	5	7	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	5	6	7	6	5	5	6	
11	13	20	21	25	7	7	6	6	7	7	7	6	6	FALSE	7	7	6	7	7	6	7	7	6	7	6	7	7	7	7	7	6	7	7
8	13	17	22	24	1	1	2	5	5	5	5	5	5	5	5	1	1	1	1	2	5	5	5	5	5	5	5	5	2	2	2	1	
9	13	17	21	25	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
8	13	18	21	26	FALSE	6	7	6	7	5	5	6	3	6	6	6	3	6	6	6	6	7	5	6	7	7	3	2	7	7	7	2	7
9	14	18	23	25	5	6	5	5	5	6	3	7	6	5	5	6	6	5	5	3	5	7	6	6	5	5	5	3	5	3	5	5	5
9	13	19	23	24	5	5	5	5	5	5	5	5	1	5	5	5	5	5	2	2	5	5	5	5	5	5	5	5	3	3	3	5	5
8	13	17	21	24	2	2	2	2	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
8	13	18	21	24	3	5	5	5	2	5	3	6	5	3	5	5	5	3	5	5	2	5	6	6	5	5	6	5	5	5	5	5	3
9	14	20	21	26	7	7	7	7	7	7	7	7	7	7	7	5	6	7	7	7	7	5	6	6	6	5	5	7	7	7	7	7	7
8	13	19	21	26	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
10	13	20	21	24	6	6	5	5	5	6	6	6	6	5	6	6	6	5	6	5	5	5	5	5	6	5	5	5	5	2	5	5	5
10	14	18	23	26	6	6	6	6	6	7	6	5	6	6	6	5	6	5	5	5	6	5	6	5	6	5	5	5	5	6	5	5	6
8	13	20	23	26	7	7	6	6	7	5	5	5	3	5	5	6	5	5	6	5	5	5	5	5	5	5	6	2	3	3	5	5	2
11	13	20	21	26	7	7	7	5	5	7	5	5	5	5	1	3	5	5	5	7	7	5	5	3	3	5	7	6	3	7	7	5	5
11	16	18	21	24	2	2	2	2	6	6	6	6	7	2	2	2	2	5	6	6	6	3	2	2	6	6	6	5	5	5	2	5	5
8	13	18	23	24	5	5	5	5	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
9	14	19	23	25	6	6	5	5	6	6	5	7	5	5	7	6	5	3	2	6	6	7	6	5	5	5	6	6	5	2	5	2	5
10	14	18	23	26	6	6	6	6	6	6	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	7	6	
9	13	0	23	25	5	3	1	3	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
9	13	17	23	24	6	6	6	6	5	7	7	7	6	7	6	6	5	6	5	5	6	6	6	6	6	6	7	6	6	6	6	6	7
11	13	20	23	25	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
11	13	19	23	25	3	5	1	3	6	5	5	5	5	5	5	3	5	5	7	7	7	5	3	3	5	5	5	3	5	2	3	5	2
9	13	18	21	25	7	7	7	7	6	7	7	7	7	7	7	7	7	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE
8	13	18	23	26	7	7	7	7	7	7	6	7	7	7	7	7	6	7	7	7	7	7	5	6	7	7	6	6	5	7	7	7	6
10	14	18	22	25	5	6	6	5	7	6	6	7	6	6	5	6	6	7	7	7	7	6	5	6	6	7	5	6	5	6	6	6	7
9	14	18	21	24	6	6	7	7	7	6	6	6	5	7	7	6	6	5	7	6	7	6	7	7	7	6	6	FALSE	FALSE	FALSE	FALSE	FALSE	FALSE

Table 27: Sample item code book

Likert Scale Responses		Age Range		Years in Company	
1	Strongly Disagree	8	0 - 30	13	0 - 5
2	Disagree	9	31 - 40	14	6 - 10
3	Somewhat disgree	10	41 - 50	15	11 - 15
4	Neither Agree nor Disagree	11	51 - 60	16	16 or more
5	Somewhat Agree	12	61 or more		
6	Agree				
7	Strongly Agree				
Designation		**Company Size**		**DT Level**	
17	Lower Management	21	Small	24	Low
18	Middle Management	22	Medium	25	Medium
19	Senior Management	23	Large	26	High
20	Executive Management				

The green shaded cells in Table 28 are cells that contain data that were imputed.

Table 28: Sample of data imputation

SCP_Q6	SCP_Q7	SCP_Q8	SCP_Q9	SCL_Q10	SCL_Q11	SCL_Q12	SCL_Q13	SCL_Q14	SCL_Q15	SCL_Q16	SCL_Q17	SCL_Q18	SPD_Q1	SPD_Q2	SPD_Q2	SPD_Q2	SPD_Q2	SPD_Q2	SPD_Q2	SPD_Q2	SPD_Q2	SPD_Q2	SA_COM	SA_COM	SA_COM	SA_COM	SA_COM	SA_COM
7	7	7	7	7	6	6	6	6	6	7	6	5	6	6	6	6	6	6	6	6	6	6	6	3	3	3	6	6
5	5	5	5	5	5	7	5	5	5	1	1	3	3	5	2	5	2	3	3	3	2	3	2	7	2	3	3	2
6	6	5	6	5	6	5	5	5	6	5	5	5	5	2	3	3	3	5	5	6	5	6	5	6	5	5	6	5
6	6	7	5	7	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	7	5	6	7	6	5	5	6
7	7	6	6	7	7	7	6	6	5	7	7	6	7	7	6	7	7	6	7	6	7	7	7	7	7	7	6	7	7
1	1	2	5	5	5	5	5	5	5	1	1	1	1	2	5	5	5	5	5	5	5	5	5	5	2	2	2	1
6	6	7	6	7	5	5	6	3	6	6	6	3	6	6	6	6	7	5	6	7	7	3	2	7	7	7	2	7
5	6	5	5	5	6	3	7	6	5	5	6	6	5	5	3	5	7	6	6	5	5	5	3	5	3	5	5	5
5	5	5	5	5	5	5	5	1	5	5	5	5	2	2	5	5	5	5	5	5	5	5	5	3	3	3	5	5
3	5	5	5	2	5	3	6	5	3	5	5	5	3	5	5	2	5	6	6	5	5	6	5	5	5	5	5	3
7	7	7	7	7	7	7	7	7	7	7	5	6	7	7	7	7	5	6	6	6	5	5	7	7	7	7	7	7
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
6	6	5	5	5	6	6	6	6	5	6	6	6	5	6	5	5	5	5	6	5	5	5	5	5	2	5	5	5
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7	7	6	6	7	5	5	5	3	5	5	6	5	5	6	5	5	5	5	5	5	5	6	2	3	3	5	5	2
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6	5	6	6	5	6	5	6	6	6	5	6	6	5	5	6	5	5	5	5	5	6	5	6	3	6	5	3	3
5	5	3	5	6	5	5	3	6	5	5	5	5	5	5	5	6	6	5	5	5	5	5	6	6	6	6	5	5

Table 29: Sample log of winsorised data points

SCP_Q6	SCP_Q7	SCP_Q8	SCP_Q9	SCL_Q10	SCL_Q11	SCL_Q12	SCL_Q13	SCL_Q14	SCL_Q15	SCL_Q16	SCL_Q17	SCL_Q18	SPD_Q19	SPD_Q20	SPD_Q21	SPD_Q22	SPD_Q23	SPD_Q24	SPD_Q25	SPD_Q26	SPD_Q27	SPD_Q28	SA_COM_Q29	SA_COM_Q30	SA_COM_Q31	SA_COM_Q32	SA_COM_Q33	SA_COM_Q34
7	7	7	7	7	6	6	6	6	6	7	6	5	6	6	6	6	6	6	6	6	6	6	6	3	3	3	6	6
5	5	5	5	5	5	7	5	5	5	1	1	3	3	5	2	5	2	3	3	3	2	3	2	7	2	3	3	2
6	6	5	6	5	6	5	5	5	6	5	5	5	5	2	3	3	3	5	5	6	5	6	5	6	5	5	6	5
6	6	7	5	7	6	6	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7	5	6	7	6	5	5	6
7	7	6	6	7	7	7	6	6	5	7	7	6	7	7	6	7	7	6	7	6	7	7	7	7	7	6	7	7
1	1	2	5	5	5	5	5	5	5	1	1	1	1	2	5	5	5	5	5	5	5	5	5	5	2	2	2	1
6	6	7	6	7	5	5	6	3	6	6	6	3	6	6	6	6	7	5	6	7	7	3	2	7	7	7	2	7
5	6	5	5	5	6	3	7	6	5	5	6	6	5	5	3	5	7	6	6	5	5	5	3	5	3	5	5	5
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6	6	5	5	5	6	6	6	6	5	6	6	6	5	6	5	5	5	5	5	6	5	5	5	5	2	5	5	5
6	6	6	6	6	7	6	5	6	6	6	5	6	5	5	5	6	5	6	5	6	5	5	5	5	6	5	5	6
7	7	6	6	7	5	5	5	3	5	5	6	5	5	6	5	5	5	5	5	5	5	6	2	3	3	5	5	2
7	7	7	5	5	7	5	5	5	5	1	3	5	5	5	7	7	5	5	3	3	5	7	6	3	7	7	5	5
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7	7	7	7	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	5	5	6	7	6
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6	5	6	6	5	6	5	6	6	6	5	6	6	5	5	5	6	5	5	5	5	5	6	5	6	3	5	3	3
5	5	3	5	6	5	5	3	6	5	5	5	5	5	5	5	6	6	5	5	5	5	5	6	6	6	6	5	5

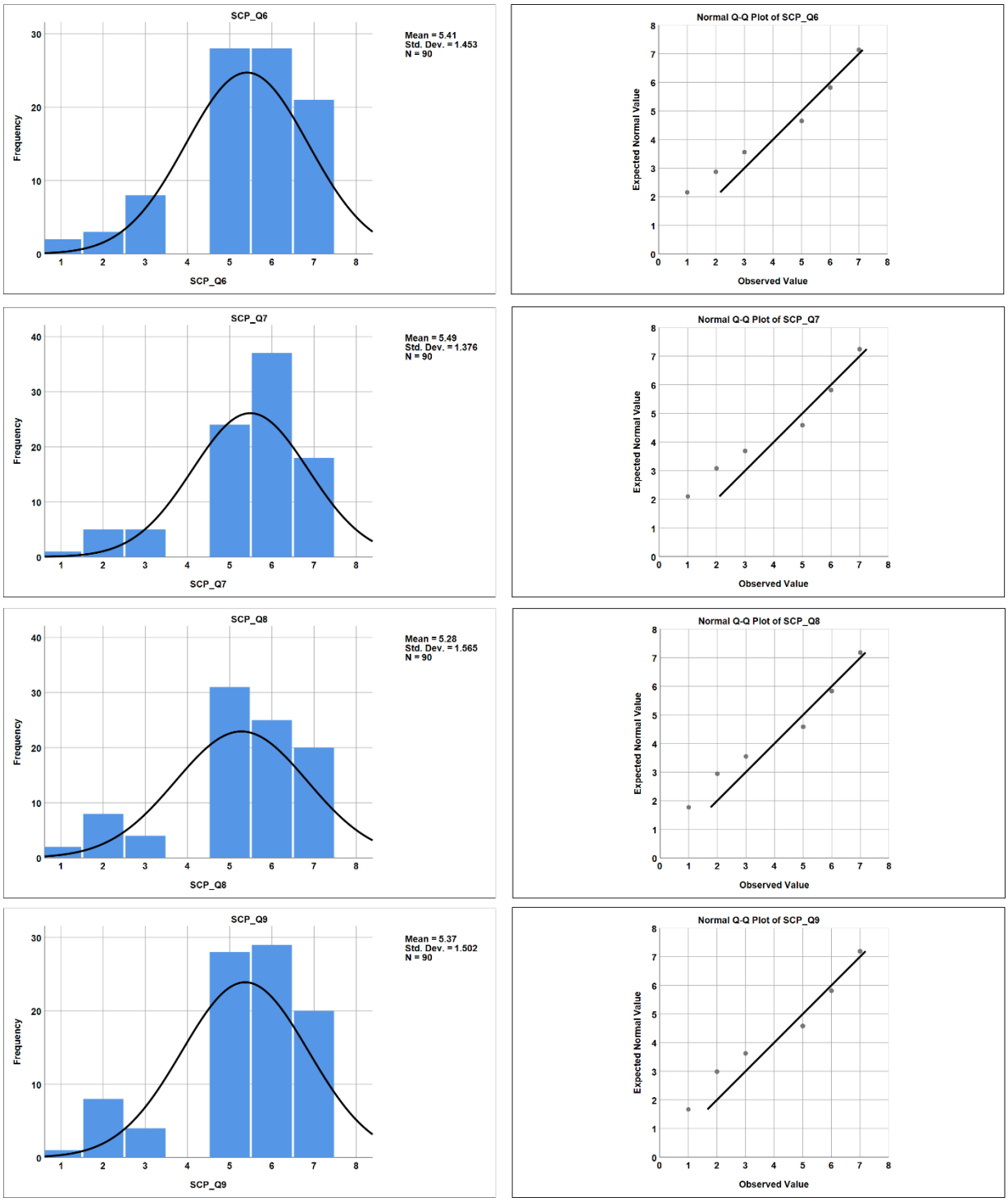
The orange cells in Table 29 are cells that contain winsorised data.

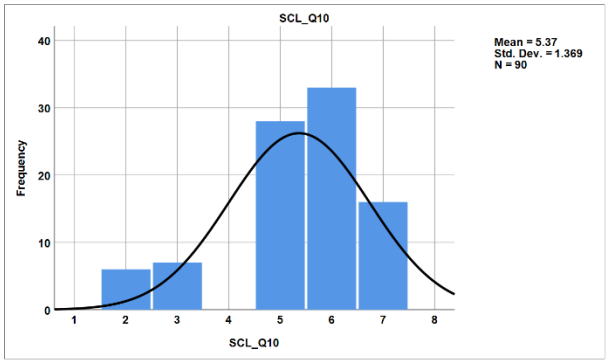
9.3.2 Normality

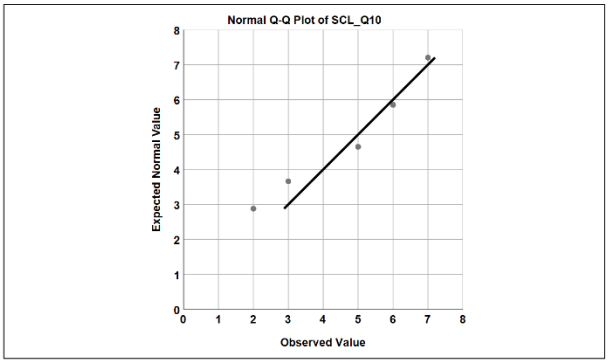
Table 30: Shapiro-Wilk test output

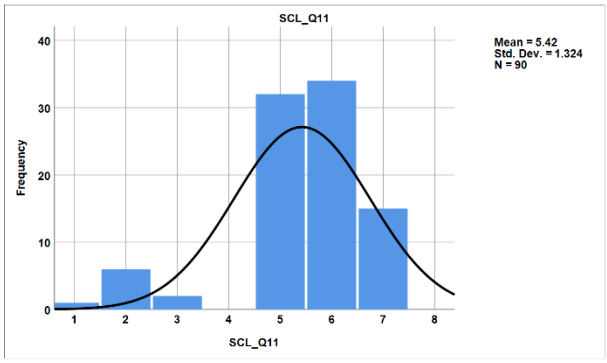
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Varaible	Statistic	df	Sig.	Statistic	df	Sig.
SCP_Q6	0.244	90	0.000	0.839	90	0.000
SCP_Q7	0.256	90	0.000	0.805	90	0.000
SCP_Q8	0.274	90	0.000	0.829	90	0.000
SCP_Q9	0.259	90	0.000	0.822	90	0.000
SCL_Q10	0.250	90	0.000	0.830	90	0.000
SCL_Q11	0.275	90	0.000	0.794	90	0.000
SCL_Q12	0.280	90	0.000	0.814	90	0.000
SCL_Q13	0.231	90	0.000	0.828	90	0.000
SCL_Q14	0.270	90	0.000	0.845	90	0.000
SCL_Q15	0.279	90	0.000	0.826	90	0.000
SCL_Q16	0.285	90	0.000	0.817	90	0.000
SCL_Q17	0.276	90	0.000	0.828	90	0.000
SCL_Q18	0.300	90	0.000	0.843	90	0.000
SPD_Q19	0.269	90	0.000	0.861	90	0.000
SPD_Q20	0.257	90	0.000	0.824	90	0.000
SPD_Q21	0.265	90	0.000	0.805	90	0.000
SPD_Q22	0.240	90	0.000	0.808	90	0.000
SPD_Q23	0.297	90	0.000	0.851	90	0.000
SPD_Q24	0.309	90	0.000	0.820	90	0.000
SPD_Q25	0.285	90	0.000	0.835	90	0.000
SPD_Q26	0.301	90	0.000	0.807	90	0.000
SPD_Q27	0.297	90	0.000	0.814	90	0.000
SPD_Q28	0.297	90	0.000	0.848	90	0.000
COM_Q29	0.264	90	0.000	0.833	90	0.000
COM_Q30	0.245	90	0.000	0.864	90	0.000
COM_Q31	0.269	90	0.000	0.877	90	0.000
COM_Q32	0.309	90	0.000	0.846	90	0.000
COM_Q33	0.299	90	0.000	0.852	90	0.000
COM_Q34	0.308	90	0.000	0.847	90	0.000

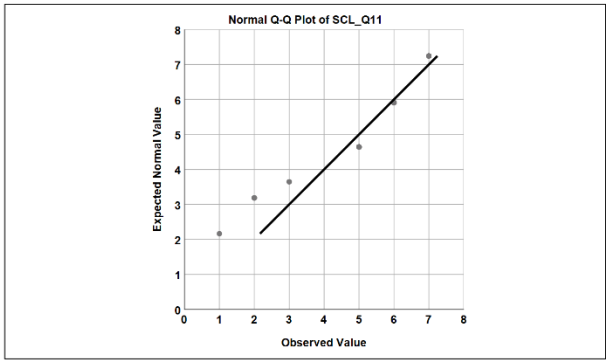
Figure 15: Histograms and Q-Q plots for questions 6 through 34

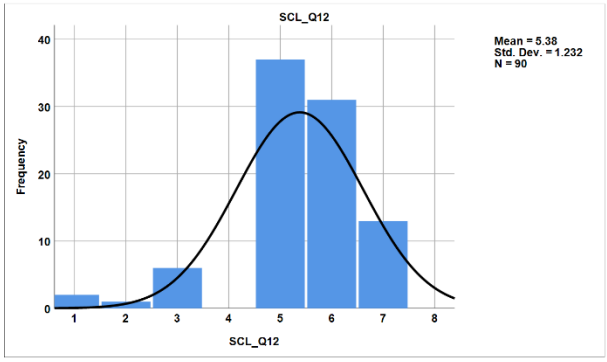


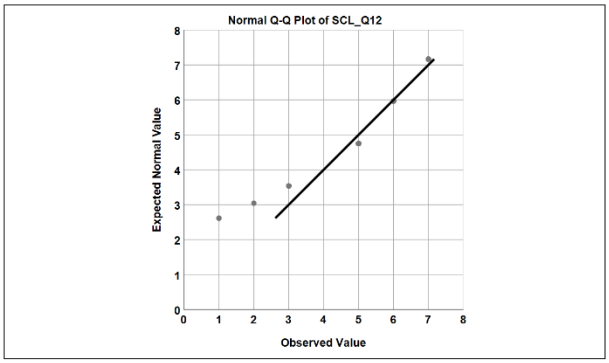

SCL_Q10
Mean = 5.37
Std. Dev. = 1.369
N = 90
Frequency
SCL_Q10

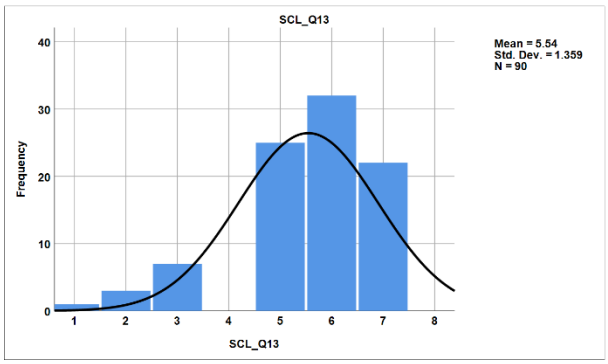

Normal Q-Q Plot of SCL_Q10
Expected Normal Value
Observed Value

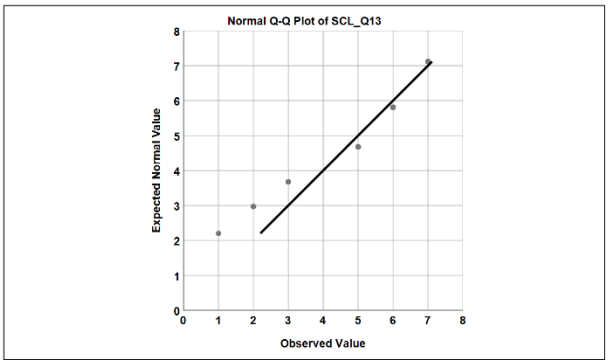

SCL_Q11
Mean = 5.42
Std. Dev. = 1.324
N = 90
Frequency
SCL_Q11

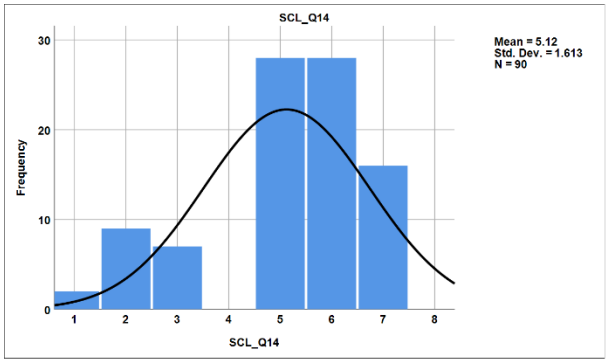

Normal Q-Q Plot of SCL_Q11
Expected Normal Value
Observed Value

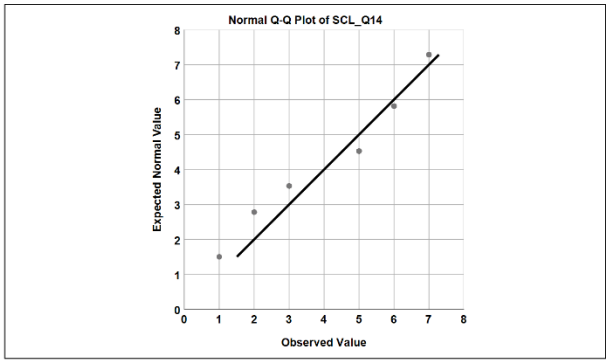

SCL_Q12
Mean = 5.38
Std. Dev. = 1.232
N = 90
Frequency
SCL_Q12

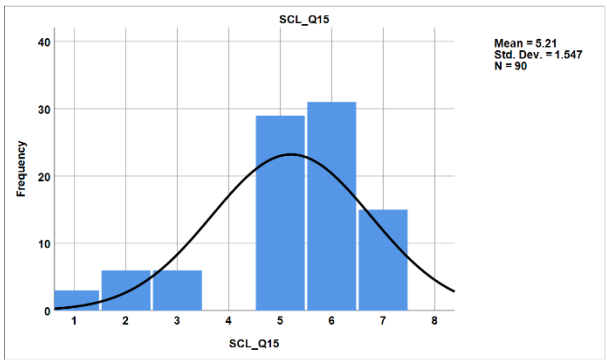

Normal Q-Q Plot of SCL_Q12
Expected Normal Value
Observed Value

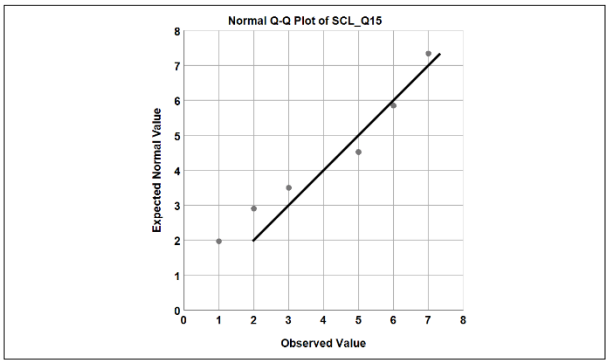

SCL_Q13
Mean = 5.54
Std. Dev. = 1.359
N = 90
Frequency
SCL_Q13

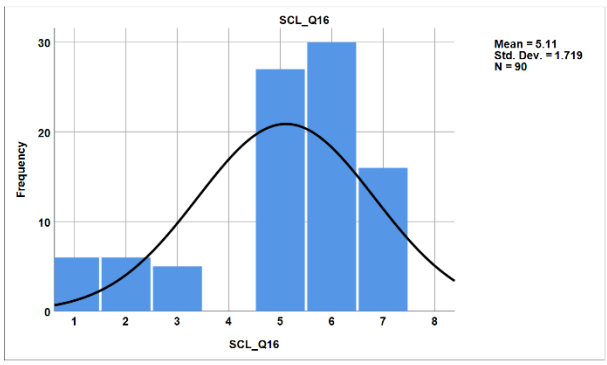

Normal Q-Q Plot of SCL_Q13
Expected Normal Value
Observed Value

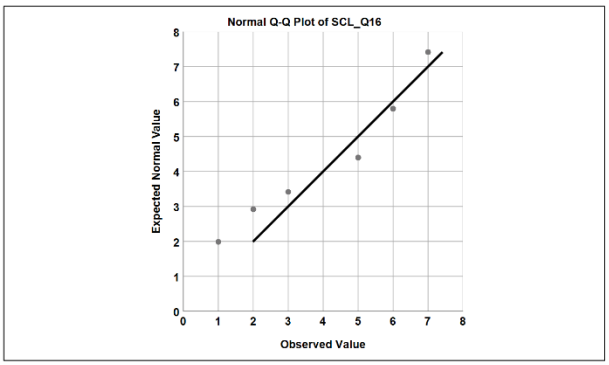

SCL_Q14
Mean = 5.12
Std. Dev. = 1.613
N = 90
Frequency
SCL_Q14

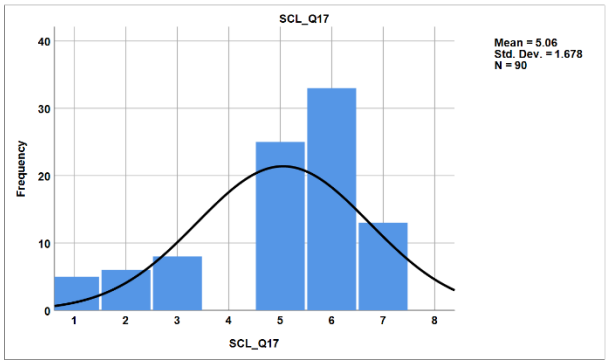

Normal Q-Q Plot of SCL_Q14
Expected Normal Value
Observed Value

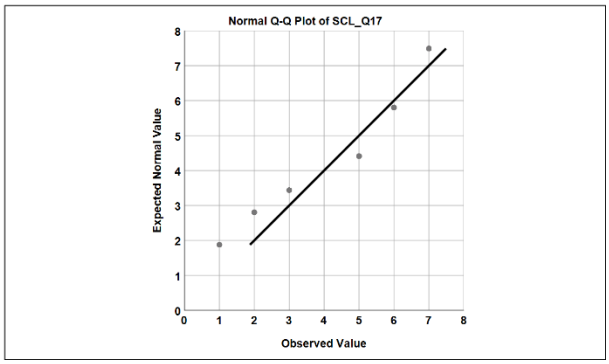

SCL_Q15
Mean = 5.21
Std. Dev. = 1.547
N = 90
Frequency
SCL_Q15

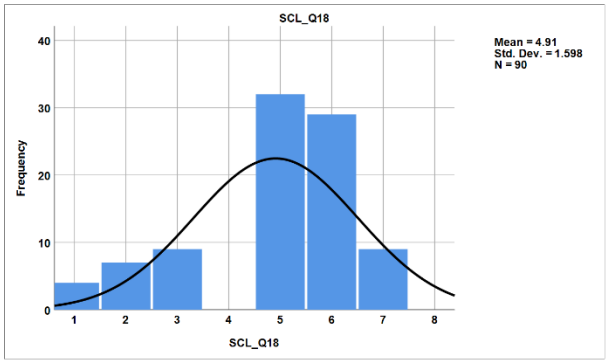

Normal Q-Q Plot of SCL_Q15
Expected Normal Value
Observed Value

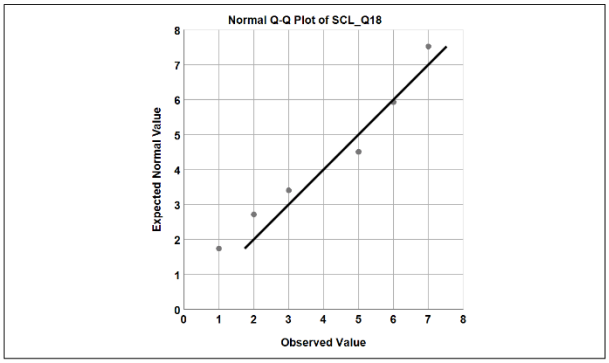

SCL_Q16
Mean = 5.11
Std. Dev. = 1.719
N = 90
Frequency
SCL_Q16

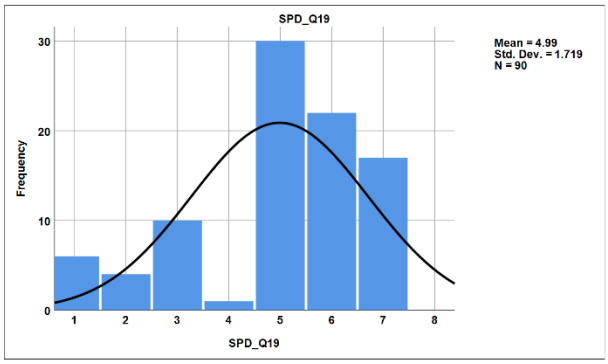

Normal Q-Q Plot of SCL_Q16
Expected Normal Value
Observed Value

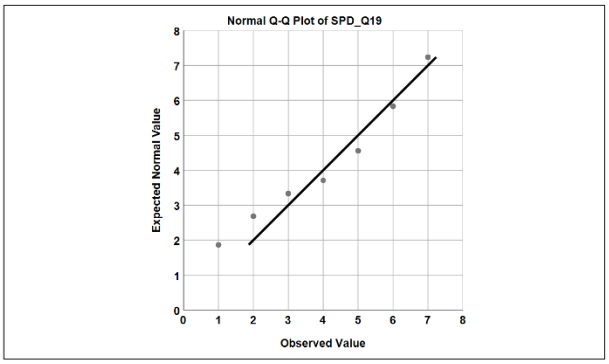

SCL_Q17
Mean = 5.06
Std. Dev. = 1.678
N = 90
Frequency
SCL_Q17

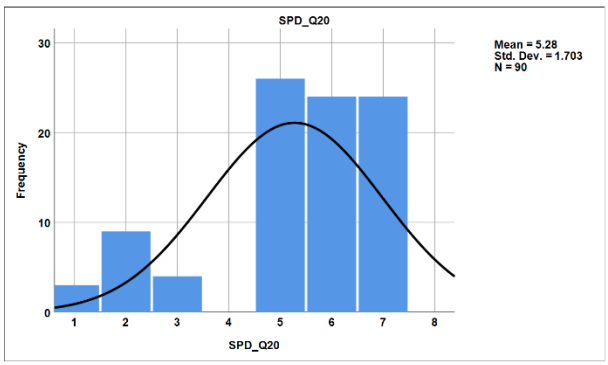

Normal Q-Q Plot of SCL_Q17
Expected Normal Value
Observed Value

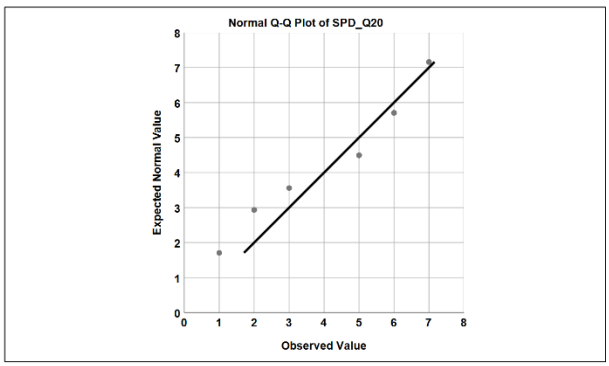

SCL_Q18
Mean = 4.91
Std. Dev. = 1.598
N = 90
Frequency
SCL_Q18

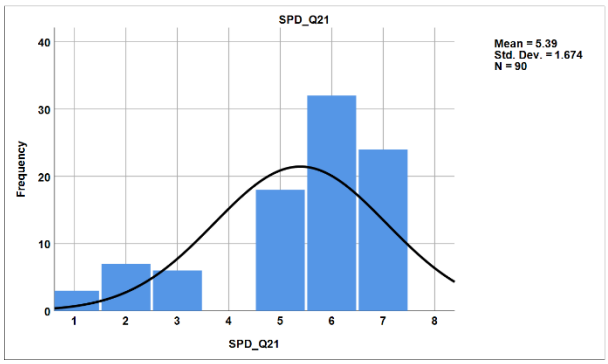

Normal Q-Q Plot of SCL_Q18
Expected Normal Value
Observed Value

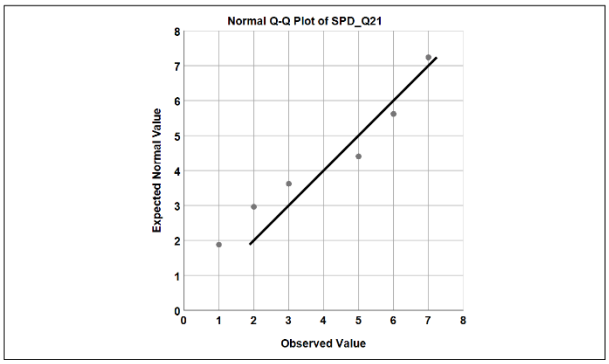

SPD_Q19
Mean = 4.99
Std. Dev. = 1.719
N = 90
Frequency
SPD_Q19

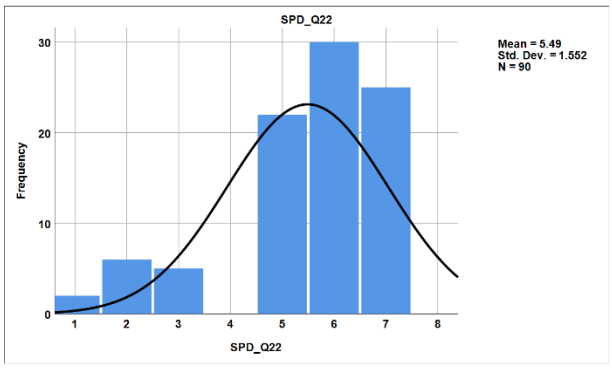

Normal Q-Q Plot of SPD_Q19
Expected Normal Value
Observed Value

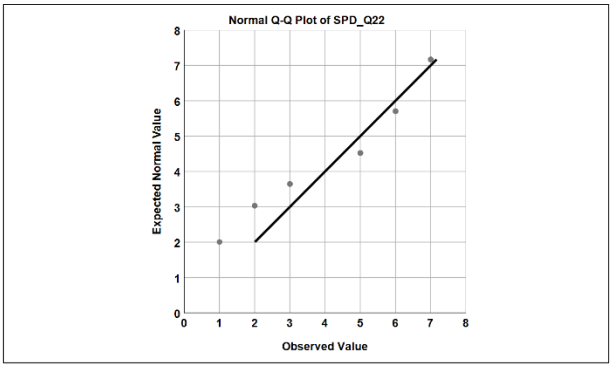

SPD_Q20
Mean = 5.28
Std. Dev. = 1.703
N = 90
Frequency
SPD_Q20

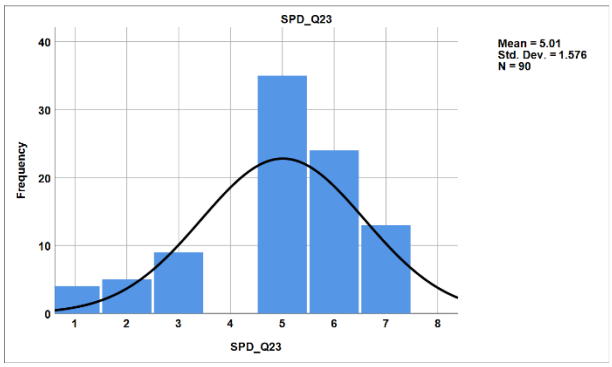

Normal Q-Q Plot of SPD_Q20
Expected Normal Value
Observed Value

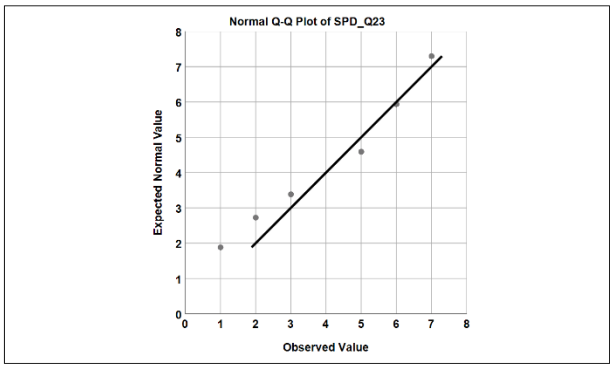

SPD_Q21
Mean = 5.39
Std. Dev. = 1.674
N = 90
Frequency
SPD_Q21

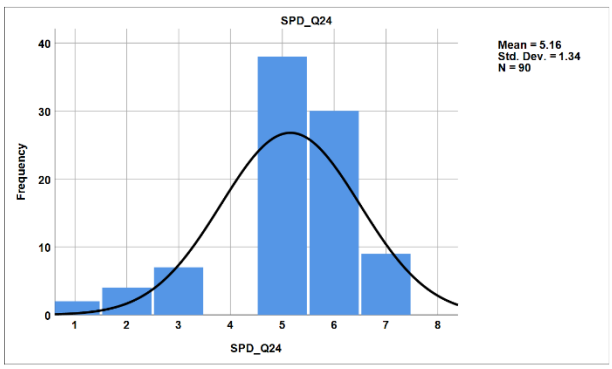

Normal Q-Q Plot of SPD_Q21
Expected Normal Value
Observed Value

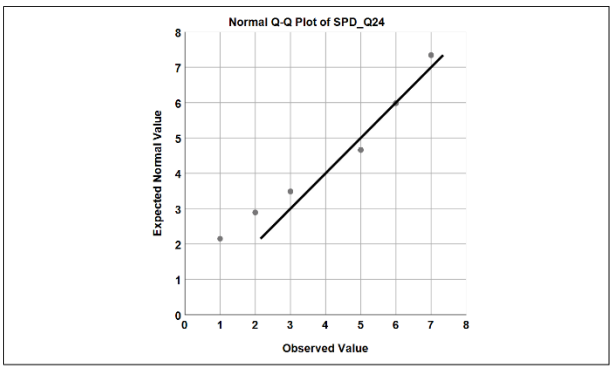

SPD_Q22
Mean = 5.49
Std. Dev. = 1.552
N = 90
Frequency
SPD_Q22

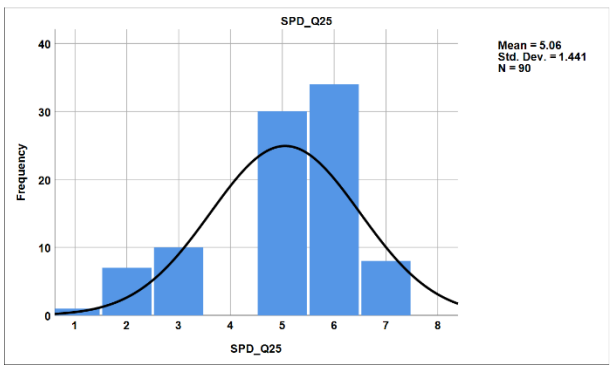

Normal Q-Q Plot of SPD_Q22
Expected Normal Value
Observed Value

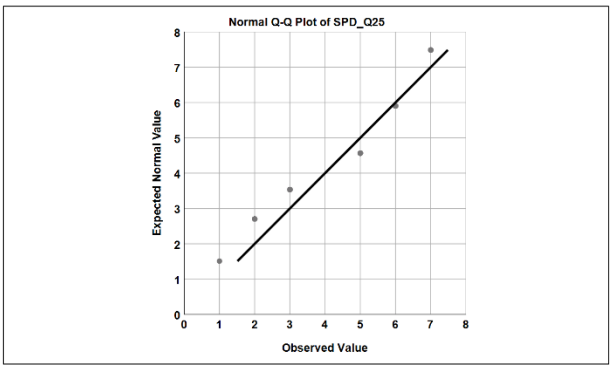

SPD_Q23
Mean = 5.01
Std. Dev. = 1.576
N = 90
Frequency
SPD_Q23

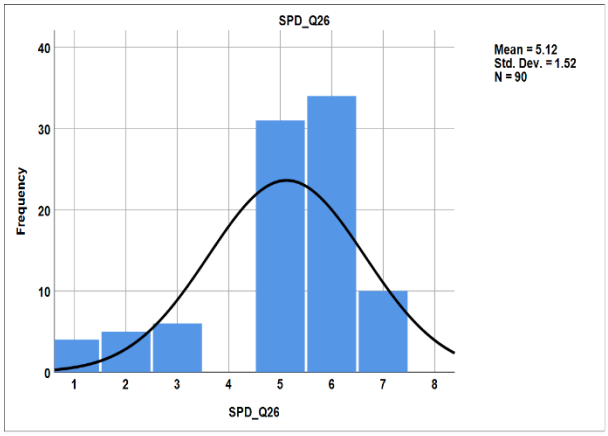

Normal Q-Q Plot of SPD_Q23
Expected Normal Value
Observed Value

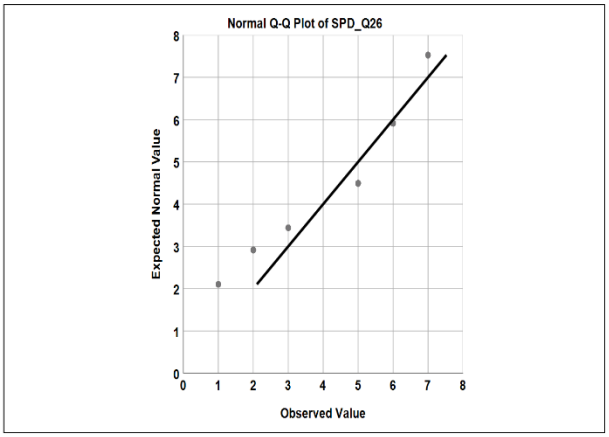

SPD_Q24
Mean = 5.16
Std. Dev. = 1.34
N = 90
Frequency
SPD_Q24

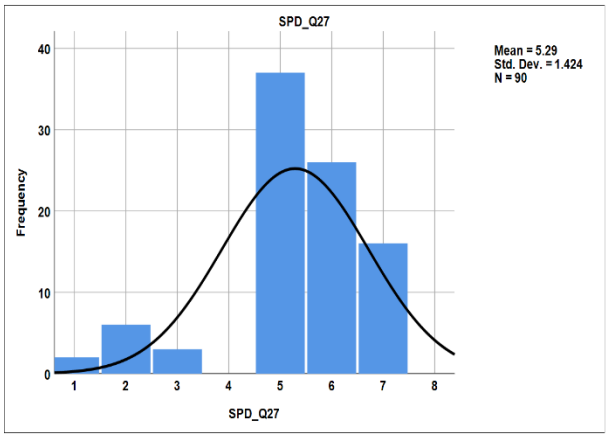

Normal Q-Q Plot of SPD_Q24
Expected Normal Value
Observed Value

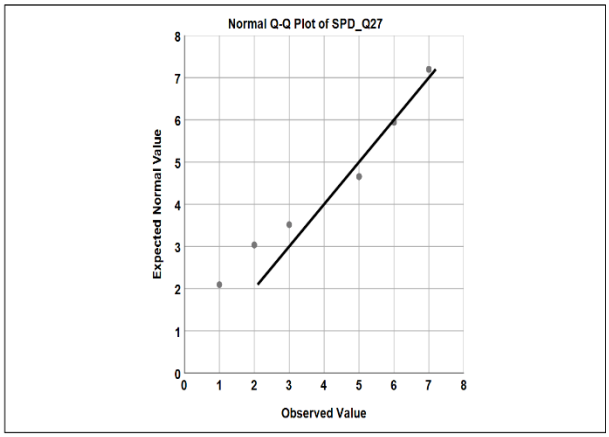

SPD_Q25
Mean = 5.06
Std. Dev. = 1.441
N = 90
Frequency
SPD_Q25

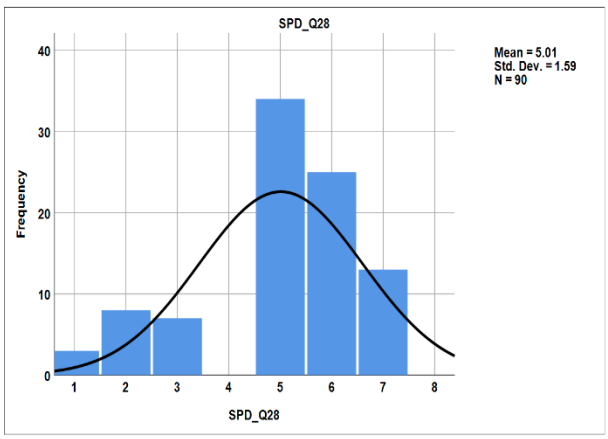

Normal Q-Q Plot of SPD_Q25
Expected Normal Value
Observed Value

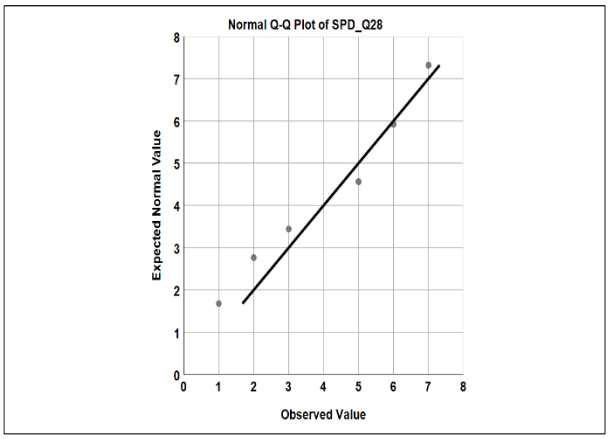

SPD_Q26
Mean = 5.12
Std. Dev. = 1.52
N = 90
Frequency
SPD_Q26

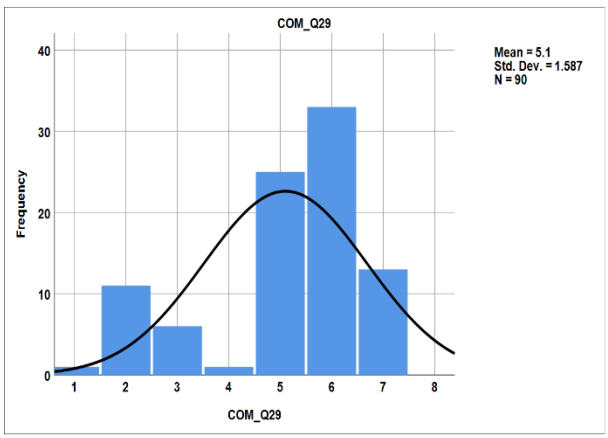

Normal Q-Q Plot of SPD_Q26
Expected Normal Value
Observed Value

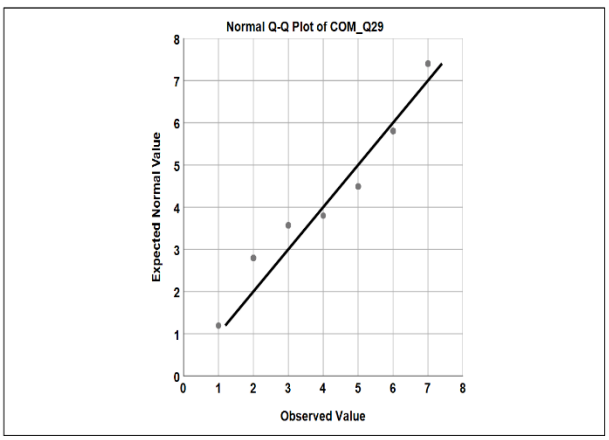

SPD_Q27
Mean = 5.29
Std. Dev. = 1.424
N = 90
Frequency
SPD_Q27

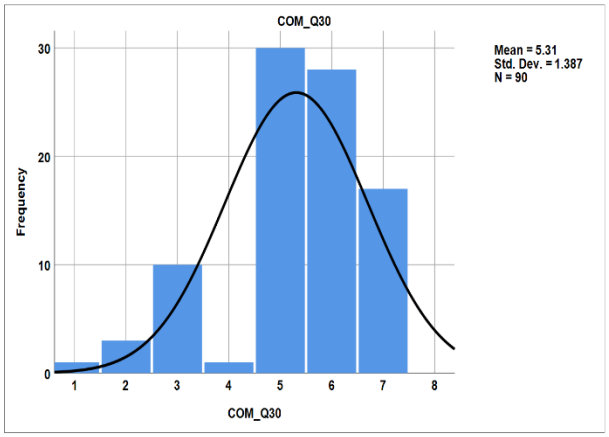

Normal Q-Q Plot of SPD_Q27
Expected Normal Value
Observed Value

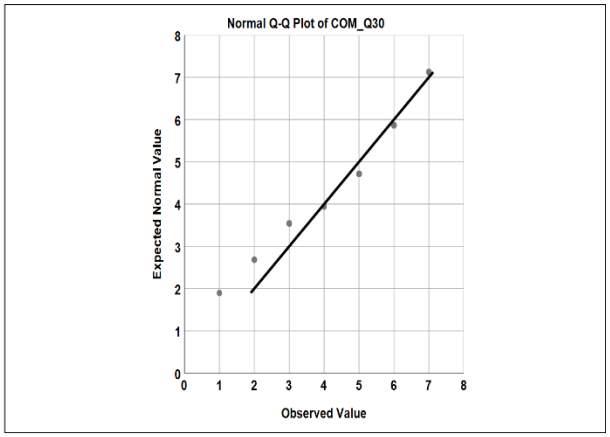

SPD_Q28
Mean = 5.01
Std. Dev. = 1.59
N = 90
Frequency
SPD_Q28

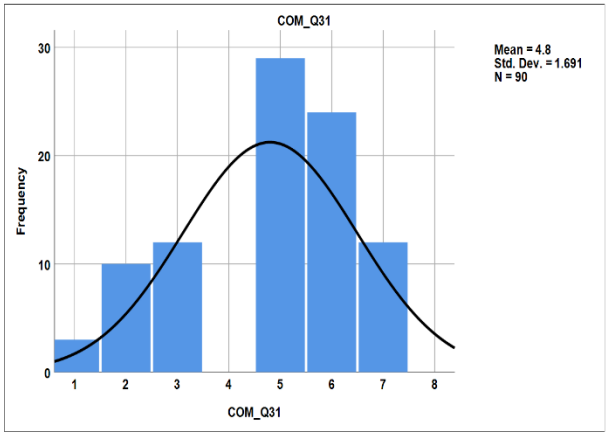

Normal Q-Q Plot of SPD_Q28
Expected Normal Value
Observed Value

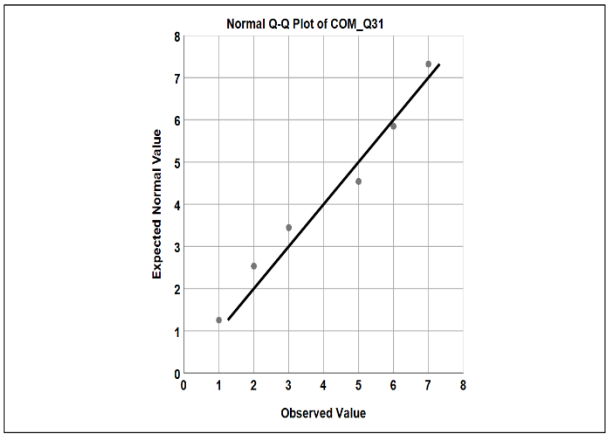

COM_Q29
Mean = 5.1
Std. Dev. = 1.587
N = 90
Frequency
COM_Q29

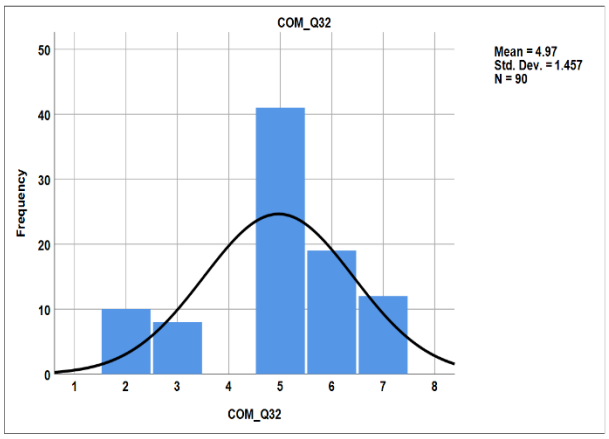

Normal Q-Q Plot of COM_Q29
Expected Normal Value
Observed Value

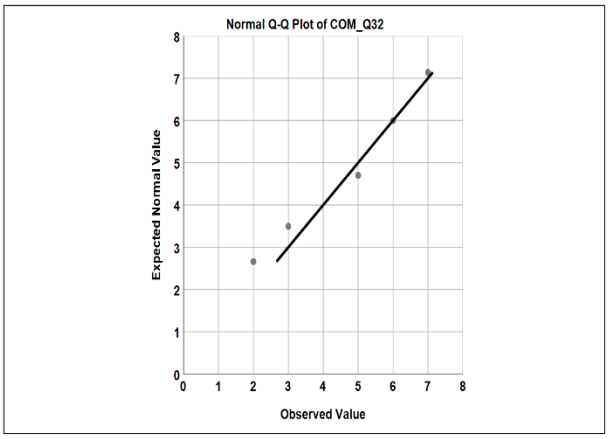

COM_Q30
Mean = 5.31
Std. Dev. = 1.387
N = 90
Frequency
COM_Q30

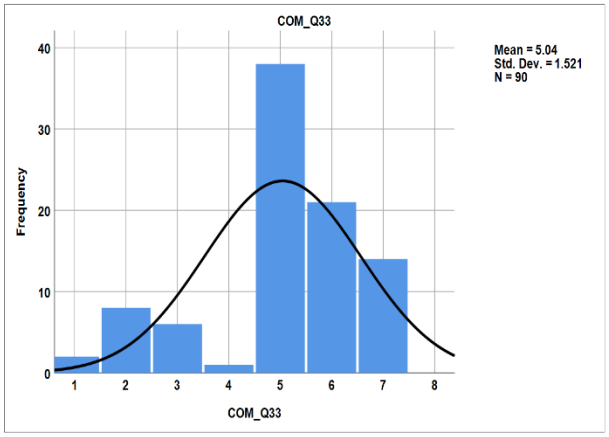

Normal Q-Q Plot of COM_Q30
Expected Normal Value
Observed Value

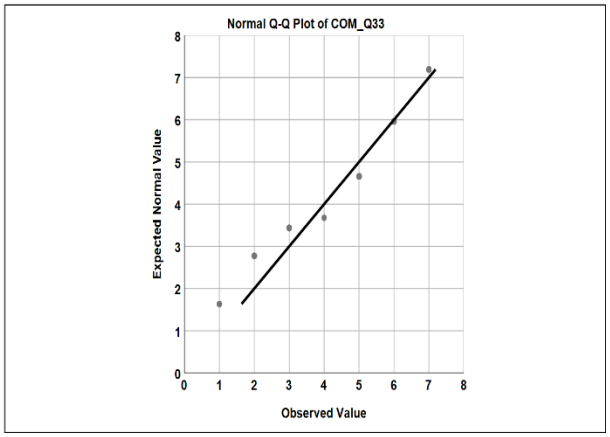

COM_Q31
Mean = 4.8
Std. Dev. = 1.691
N = 90
Frequency
COM_Q31

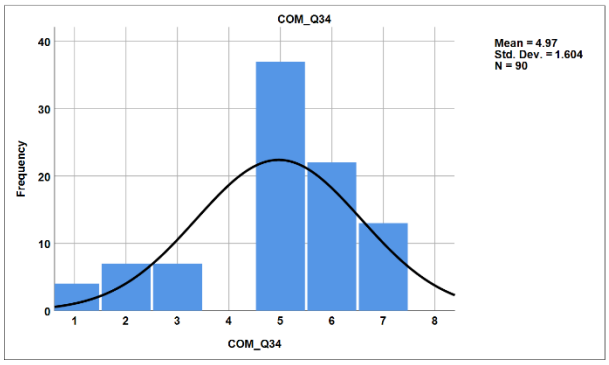

Normal Q-Q Plot of COM_Q31
Expected Normal Value
Observed Value


COM_Q32
Mean = 4.97
Std. Dev. = 1.457
N = 90
Frequency
COM_Q32


Normal Q-Q Plot of COM_Q32
Expected Normal Value
Observed Value


COM_Q33
Mean = 5.04
Std. Dev. = 1.521
N = 90
Frequency
COM_Q33


Normal Q-Q Plot of COM_Q33
Expected Normal Value
Observed Value


COM_Q34
Mean = 4.97
Std. Dev. = 1.604
N = 90
Frequency
COM_Q34

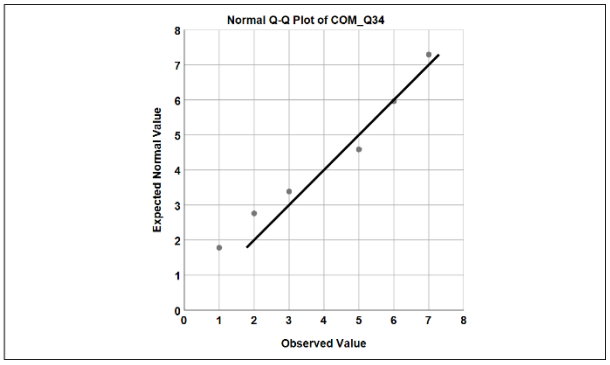

Normal Q-Q Plot of COM_Q34
Expected Normal Value
Observed Value

Table 31: Data characteristics per question

	Mean		Interval for Mean		5% Trimmed Mean	Median	Variance	Std. Deviation	Minimum	Maximum	Range	Interquartile Range	Skewness		Kurtosis	
			Lower Bound	Upper Bound												
	Statistic	Std. Error	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SCP_Q6	5.41	0.153	5.11	5.72	5.54	6.00	2.110	1.453	1	7	6	1	-1.181	0.254	1.140	0.503
SCP_Q7	5.49	0.145	5.20	5.78	5.61	6.00	1.893	1.376	1	7	6	1	-1.392	0.254	1.714	0.503
SCP_Q8	5.28	0.165	4.95	5.61	5.39	5.50	2.450	1.565	1	7	6	1	-1.123	0.254	0.668	0.503
SCP_Q9	5.37	0.158	5.05	5.68	5.48	6.00	2.257	1.502	1	7	6	1	-1.181	0.254	0.822	0.503
SCL_Q10	5.37	0.144	5.08	5.65	5.46	6.00	1.875	1.369	2	7	5	1	-1.096	0.254	0.690	0.503
SCL_Q11	5.42	0.140	5.14	5.70	5.54	6.00	1.752	1.324	1	7	6	1	-1.448	0.254	2.267	0.503
SCL_Q12	5.38	0.130	5.12	5.64	5.48	5.00	1.519	1.232	1	7	6	1	-1.388	0.254	2.900	0.503
SCL_Q13	5.54	0.143	5.26	5.83	5.67	6.00	1.846	1.359	1	7	6	1	-1.264	0.254	1.465	0.503
SCL_Q14	5.12	0.170	4.78	5.46	5.22	5.00	2.603	1.613	1	7	6	1	-0.974	0.254	0.072	0.503
SCL_Q15	5.21	0.163	4.89	5.54	5.33	6.00	2.393	1.547	1	7	6	1	-1.200	0.254	0.864	0.503
SCL_Q16	5.11	0.181	4.75	5.47	5.23	6.00	2.954	1.719	1	7	6	1	-1.167	0.254	0.475	0.503
SCL_Q17	5.06	0.177	4.70	5.41	5.17	6.00	2.817	1.678	1	7	6	1	-1.096	0.254	0.274	0.503
SCL_Q18	4.91	0.168	4.58	5.25	5.01	5.00	2.554	1.598	1	7	6	1	-1.000	0.254	0.160	0.503
SPD_Q19	4.99	0.181	4.63	5.35	5.10	5.00	2.955	1.719	1	7	6	1	-0.919	0.254	0.058	0.503
SPD_Q20	5.28	0.179	4.92	5.63	5.40	6.00	2.900	1.703	1	7	6	2	-1.089	0.254	0.283	0.503
SPD_Q21	5.39	0.176	5.04	5.74	5.52	6.00	2.802	1.674	1	7	6	2	-1.228	0.254	0.568	0.503
SPD_Q22	5.49	0.164	5.16	5.81	5.62	6.00	2.410	1.552	1	7	6	2	-1.306	0.254	1.090	0.503
SPD_Q23	5.01	0.166	4.68	5.34	5.12	5.00	2.483	1.576	1	7	6	1	-1.006	0.254	0.444	0.503
SPD_Q24	5.16	0.141	4.87	5.44	5.25	5.00	1.796	1.340	1	7	6	1	-1.265	0.254	1.606	0.503
SPD_Q25	5.06	0.152	4.75	5.36	5.13	5.00	2.076	1.441	1	7	6	1	-1.021	0.254	0.246	0.503
SPD_Q26	5.12	0.160	4.80	5.44	5.24	5.00	2.311	1.520	1	7	6	1	-1.310	0.254	1.165	0.503
SPD_Q27	5.29	0.150	4.99	5.59	5.40	5.00	2.028	1.424	1	7	6	1	-1.268	0.254	1.587	0.503
SPD_Q28	5.01	0.168	4.68	5.34	5.10	5.00	2.528	1.590	1	7	6	1	-0.979	0.254	0.237	0.503
COM_Q29	5.10	0.167	4.77	5.43	5.18	6.00	2.518	1.587	1	7	6	1	-0.979	0.254	-0.056	0.503
COM_Q30	5.31	0.146	5.02	5.60	5.41	5.50	1.925	1.387	1	7	6	1	-0.967	0.254	0.593	0.503
COM_Q31	4.80	0.178	4.45	5.15	4.87	5.00	2.858	1.691	1	7	6	3	-0.677	0.254	-0.607	0.503
COM_Q32	4.97	0.154	4.66	5.27	5.02	5.00	2.122	1.457	2	7	5	1	-0.744	0.254	-0.113	0.503
COM_Q33	5.04	0.160	4.73	5.36	5.13	5.00	2.313	1.521	1	7	6	1	-0.939	0.254	0.381	0.503
COM_Q34	4.97	0.169	4.63	5.30	5.07	5.00	2.572	1.604	1	7	6	1	-0.981	0.254	0.321	0.503

Table 32: Skewness and Kurtosis for Age Range categorical variable

	N					Skewness										Kurtosis									
	Statistic					Statistic					Std. Error					Statistic					Std. Error				
	Age Range					Age Range					Age Range					Age Range					Age Range				
	0 to 30	31 to 40	41 to 50	51 to 60	61 or more	0 to 30	31 to 40	41 to 50	51 to 60	61 or more	0 to 30	31 to 40	41 to 50	51 to 60	61 or more	0 to 30	31 to 40	41 to 50	51 to 60	61 or more	0 to 30	31 to 40	41 to 50	51 to 60	61 or more
SCP_Q6	31	41	10	6	2	-0.790	-1.333	0.166	-0.874		0.421	0.369	0.687	0.845		-0.337	3.327	-0.734	-1.344		0.821	0.724	1.334	1.741	
SCP_Q7	31	41	10	6	2	-1.283	-1.324	0.000	-1.281		0.421	0.369	0.687	0.845		1.195	1.512	0.080	1.853		0.821	0.724	1.334	1.741	
SCP_Q8	31	41	10	6	2	-1.019	-0.914	-1.938	-0.926		0.421	0.369	0.687	0.845		0.028	0.814	4.923	-1.429		0.821	0.724	1.334	1.741	
SCP_Q9	31	41	10	6	2	-1.405	-1.217	-1.399	-0.638		0.421	0.369	0.687	0.845		1.564	1.127	1.208	-1.243		0.821	0.724	1.334	1.741	
SCL_Q10	31	41	10	6	2	-0.928	-1.124	-1.366	0.313		0.421	0.369	0.687	0.845		0.399	0.815	1.023	-0.104		0.821	0.724	1.334	1.741	
SCL_Q11	31	41	10	6	2	-1.707	-1.429	-1.171	-0.313		0.421	0.369	0.687	0.845		4.762	1.704	0.660	-0.104		0.821	0.724	1.334	1.741	
SCL_Q12	31	41	10	6	2	-1.295	-1.060	-2.785	1.537		0.421	0.369	0.687	0.845		3.224	1.168	8.097	1.429		0.821	0.724	1.334	1.741	
SCL_Q13	31	41	10	6	2	-1.462	-1.175	-1.333	-0.968		0.421	0.369	0.687	0.845		3.168	0.429	2.628	-1.875		0.821	0.724	1.334	1.741	
SCL_Q14	31	41	10	6	2	-0.877	-0.910	-1.473	0.313		0.421	0.369	0.687	0.845		-0.097	-0.186	1.226	-0.104		0.821	0.724	1.334	1.741	
SCL_Q15	31	41	10	6	2	-1.220	-1.146	-1.938	-1.934		0.421	0.369	0.687	0.845		0.744	0.764	4.923	4.554		0.821	0.724	1.334	1.741	
SCL_Q16	31	41	10	6	2	-1.188	-1.264	-1.399	-0.600		0.421	0.369	0.687	0.845		0.388	0.862	1.208	-1.289		0.821	0.724	1.334	1.741	
SCL_Q17	31	41	10	6	2	-1.192	-1.054	-2.182	0.000		0.421	0.369	0.687	0.845		0.606	0.094	5.766	-2.526		0.821	0.724	1.334	1.741	
SCL_Q18	31	41	10	6	2	-0.972	-0.861	-1.961	-1.840		0.421	0.369	0.687	0.845		0.066	-0.174	4.853	3.912		0.821	0.724	1.334	1.741	
SPD_Q19	31	41	10	6	2	-1.004	-0.811	-1.115	1.438		0.421	0.369	0.687	0.845		0.704	-0.487	0.402	3.603		0.821	0.724	1.334	1.741	
SPD_Q20	31	41	10	6	2	-1.392	-0.871	-0.921	0.000		0.421	0.369	0.687	0.845		1.880	-0.572	0.128	-1.875		0.821	0.724	1.334	1.741	
SPD_Q21	31	41	10	6	2	-1.107	-1.177	-1.546	-0.313		0.421	0.369	0.687	0.845		0.347	0.228	2.885	-0.104		0.821	0.724	1.334	1.741	
SPD_Q22	31	41	10	6	2	-1.016	-1.495	-1.320	0.000		0.421	0.369	0.687	0.845		0.115	1.935	0.685	-3.333		0.821	0.724	1.334	1.741	
SPD_Q23	31	41	10	6	2	-0.816	-1.345	-0.859	0.000		0.421	0.369	0.687	0.845		-0.010	1.416	-0.782	2.500		0.821	0.724	1.334	1.741	
SPD_Q24	31	41	10	6	2	-1.172	-1.316	-1.401	-0.811		0.421	0.369	0.687	0.845		2.266	1.469	4.157	-1.029		0.821	0.724	1.334	1.741	
SPD_Q25	31	41	10	6	2	-1.133	-1.104	-1.728	0.254		0.421	0.369	0.687	0.845		0.798	0.403	4.386	-1.828		0.821	0.724	1.334	1.741	
SPD_Q26	31	41	10	6	2	-1.079	-1.479	-1.319	-1.586		0.421	0.369	0.687	0.845		0.876	1.655	0.572	2.552		0.821	0.724	1.334	1.741	
SPD_Q27	31	41	10	6	2	-1.063	-1.399	-1.460	0.857		0.421	0.369	0.687	0.845		0.788	2.080	3.349	-0.300		0.821	0.724	1.334	1.741	
SPD_Q28	31	41	10	6	2	-0.868	-1.054	-0.897	0.000		0.421	0.369	0.687	0.845		0.023	0.184	0.626	-1.875		0.821	0.724	1.334	1.741	
COM_Q29	31	41	10	6	2	-0.793	-1.147	-1.149	-0.889		0.421	0.369	0.687	0.845		-0.772	0.470	0.819	1.339		0.821	0.724	1.334	1.741	
COM_Q30	31	41	10	6	2	-1.416	-0.706	-0.989	-0.889		0.421	0.369	0.687	0.845		2.035	-0.113	0.438	1.339		0.821	0.724	1.334	1.741	
COM_Q31	31	41	10	6	2	-0.534	-0.723	-1.531	-0.302		0.421	0.369	0.687	0.845		-0.667	-0.541	0.817	-1.419		0.821	0.724	1.334	1.741	
COM_Q32	31	41	10	6	2	-0.591	-1.021	-0.973	-0.392		0.421	0.369	0.687	0.845		-0.528	0.653	0.438	-0.943		0.821	0.724	1.334	1.741	
COM_Q33	31	41	10	6	2	-0.845	-0.936	-1.245	-0.440		0.421	0.369	0.687	0.845		0.364	0.018	2.990	1.335		0.821	0.724	1.334	1.741	
COM_Q34	31	41	10	6	2	-0.934	-1.153	-0.817	-0.392		0.421	0.369	0.687	0.845		-0.016	1.051	0.353	-0.943		0.821	0.724	1.334	1.741	
Valid N	31	41	10	6	2																				

Table 33: Skewness and Kurtosis for Tenure categorical variable

	N				Skewness								Kurtosis							
	Statistic				Statistic				Std. Error				Statistic				Std. Error			
	Tenure				Tenure				Tenure				Tenure				Tenure			
	0 to 5	6 to 10	11 to 15	16 or more	0 to 5	6 to 10	11 to 15	16 or more	0 to 5	6 to 10	11 to 15	16 or more	0 to 5	6 to 10	11 to 15	16 or more	0 to 5	6 to 10	11 to 15	16 or more
SCP_Q6	57	22	5	6	-1.091	-0.931	-1.361	-1.281	0.316	0.491	0.913	0.845	0.657	2.143	2.000	1.853	0.623	0.953	2.000	1.741
SCP_Q7	57	22	5	6	-1.429	-1.231	0.609	0.000	0.316	0.491	0.913	0.845	1.714	3.300	-3.333	-2.526	0.623	0.953	2.000	1.741
SCP_Q8	57	22	5	6	-1.218	-1.338	-1.293	-0.811	0.316	0.491	0.913	0.845	0.930	1.447	2.917	-1.029	0.623	0.953	2.000	1.741
SCP_Q9	57	22	5	6	-1.143	-1.900	2.236	0.000	0.316	0.491	0.913	0.845	0.693	4.071	5.000	-2.526	0.623	0.953	2.000	1.741
SCL_Q10	57	22	5	6	-1.146	-1.283	-1.118	-0.811	0.316	0.491	0.913	0.845	0.833	2.447	1.456	-1.029	0.623	0.953	2.000	1.741
SCL_Q11	57	22	5	6	-1.490	-1.708	2.236	-0.919	0.316	0.491	0.913	0.845	2.549	3.542	5.000	-1.205	0.623	0.953	2.000	1.741
SCL_Q12	57	22	5	6	-1.224	-1.908	2.236	-1.934	0.316	0.491	0.913	0.845	2.406	5.195	5.000	4.554	0.623	0.953	2.000	1.741
SCL_Q13	57	22	5	6	-1.271	-0.987	0.609	0.000	0.316	0.491	0.913	0.845	1.487	0.318	-3.333	2.500	0.623	0.953	2.000	1.741
SCL_Q14	57	22	5	6	-0.929	-1.320	2.236	-0.585	0.316	0.491	0.913	0.845	-0.036	0.929	5.000	-1.550	0.623	0.953	2.000	1.741
SCL_Q15	57	22	5	6	-1.268	-1.437	0.000	-1.281	0.316	0.491	0.913	0.845	0.964	1.978	2.000	1.853	0.623	0.953	2.000	1.741
SCL_Q16	57	22	5	6	-1.178	-1.519	1.258	0.254	0.316	0.491	0.913	0.845	0.246	2.994	0.312	-1.828	0.623	0.953	2.000	1.741
SCL_Q17	57	22	5	6	-1.022	-1.632	1.258	-0.900	0.316	0.491	0.913	0.845	-0.019	2.003	0.313	-1.175	0.623	0.953	2.000	1.741
SCL_Q18	57	22	5	6	-1.023	-1.291	-1.293	-0.404	0.316	0.491	0.913	0.845	0.344	0.779	2.917	-1.617	0.623	0.953	2.000	1.741
SPD_Q19	57	22	5	6	-0.770	-1.081	-1.749	-1.572	0.316	0.491	0.913	0.845	-0.321	1.091	3.724	3.420	0.623	0.953	2.000	1.741
SPD_Q20	57	22	5	6	-0.929	-1.457	-0.552	-2.217	0.316	0.491	0.913	0.845	-0.181	2.370	0.868	5.082	0.623	0.953	2.000	1.741
SPD_Q21	57	22	5	6	-1.084	-1.452	-0.512	-2.248	0.316	0.491	0.913	0.845	-0.004	2.688	-0.612	5.357	0.623	0.953	2.000	1.741
SPD_Q22	57	22	5	6	-1.140	-1.164	-1.089	-1.611	0.316	0.491	0.913	0.845	0.386	2.168	0.536	2.958	0.623	0.953	2.000	1.741
SPD_Q23	57	22	5	6	-0.890	-1.589	-1.714	-0.450	0.316	0.491	0.913	0.845	0.387	2.543	2.664	-1.175	0.623	0.953	2.000	1.741
SPD_Q24	57	22	5	6	-0.928	0.212	2.236	-0.874	0.316	0.491	0.913	0.845	0.552	-0.554	5.000	-1.344	0.623	0.953	2.000	1.741
SPD_Q25	57	22	5	6	-0.947	-0.970	-1.361	-1.047	0.316	0.491	0.913	0.845	0.128	0.390	2.000	-1.405	0.623	0.953	2.000	1.741
SPD_Q26	57	22	5	6	-1.096	-1.595	-0.609	-0.926	0.316	0.491	0.913	0.845	0.507	5.293	-3.333	-1.429	0.623	0.953	2.000	1.741
SPD_Q27	57	22	5	6	-1.151	-1.378	1.258	-1.755	0.316	0.491	0.913	0.845	1.168	2.479	0.312	3.657	0.623	0.953	2.000	1.741
SPD_Q28	57	22	5	6	-0.805	-1.329	-1.736	-1.755	0.316	0.491	0.913	0.845	-0.072	1.520	3.251	3.657	0.623	0.953	2.000	1.741
COM_Q2	57	22	5	6	-0.860	-1.300	0.000	-1.936	0.316	0.491	0.913	0.845	-0.514	1.861	2.000	3.958	0.623	0.953	2.000	1.741
COM_Q3	57	22	5	6	-0.764	-1.939	-0.166	0.000	0.316	0.491	0.913	0.845	-0.247	5.984	-2.407	-3.333	0.623	0.953	2.000	1.741
COM_Q3	57	22	5	6	-0.457	-1.073	0.000	-2.250	0.316	0.491	0.913	0.845	-0.912	0.045	2.000	5.125	0.623	0.953	2.000	1.741
COM_Q3	57	22	5	6	-0.636	-1.315	2.236	0.026	0.316	0.491	0.913	0.845	-0.400	2.625	5.000	-2.367	0.623	0.953	2.000	1.741
COM_Q3	57	22	5	6	-1.050	-0.780	-2.236	-1.438	0.316	0.491	0.913	0.845	0.413	0.261	5.000	3.603	0.623	0.953	2.000	1.741
COM_Q3	57	22	5	6	-0.935	-1.343	2.236	-0.165	0.316	0.491	0.913	0.845	-0.064	2.542	5.000	-0.177	0.623	0.953	2.000	1.741
Valid N	57	22	5	6																

Table 34: Skewness and Kurtosis for Designation categorical variable

	N				Skewness								Kurtosis							
	Statistic				Statistic				Std. Error				Statistic				Std. Error			
	Designation				Designation				Designation				Designation				Designation			
	Lower Mngt	Middle Mngt	Senior Mngt	Executive Mngt	Lower Mngt	Middle Mngt	Senior Mngt	Executive Mngt	Lower Mngt	Middle Mngt	Senior Mngt	Executive Mngt	Lower Mngt	Middle Mngt	Senior Mngt	Executive Mngt	Lower Mngt	Middle Mngt	Senior Mngt	Executive Mngt
SCP_Q6	19	39	17	15	-1.218	-0.973	-0.978	-0.555	0.524	0.378	0.550	0.580	1.205	0.246	1.498	-1.132	1.014	0.741	1.063	1.121
SCP_Q7	19	39	17	15	-2.137	-1.137	-1.522	-0.142	0.524	0.378	0.550	0.580	5.653	0.313	2.509	-1.783	1.014	0.741	1.063	1.121
SCP_Q8	19	39	17	15	-1.415	-0.961	-0.932	0.433	0.524	0.378	0.550	0.580	2.017	-0.048	0.270	-1.545	1.014	0.741	1.063	1.121
SCP_Q9	19	39	17	15	-1.393	-0.981	-0.969	-0.658	0.524	0.378	0.550	0.580	3.394	-0.235	-0.033	1.805	1.014	0.741	1.063	1.121
SCL_Q10	19	39	17	15	-0.841	-1.006	-0.938	-0.878	0.524	0.378	0.550	0.580	2.353	0.155	-0.251	1.308	1.014	0.741	1.063	1.121
SCL_Q11	19	39	17	15	-0.712	-1.428	-2.013	-0.463	0.524	0.378	0.550	0.580	1.030	1.703	3.508	0.545	1.014	0.741	1.063	1.121
SCL_Q12	19	39	17	15	-0.255	-1.644	-1.117	0.941	0.524	0.378	0.550	0.580	0.765	2.584	1.744	-0.785	1.014	0.741	1.063	1.121
SCL_Q13	19	39	17	15	0.471	-1.030	-1.833	-0.455	0.524	0.378	0.550	0.580	-0.883	-0.059	4.736	1.705	1.014	0.741	1.063	1.121
SCL_Q14	19	39	17	15	-0.629	-1.284	-0.908	-0.317	0.524	0.378	0.550	0.580	-0.551	0.554	-0.073	0.187	1.014	0.741	1.063	1.121
SCL_Q15	19	39	17	15	-1.086	-1.116	-2.339	-0.425	0.524	0.378	0.550	0.580	0.340	0.249	7.920	-0.172	1.014	0.741	1.063	1.121
SCL_Q16	19	39	17	15	-1.280	-1.015	-1.721	-0.995	0.524	0.378	0.550	0.580	0.171	0.063	3.668	1.272	1.014	0.741	1.063	1.121
SCL_Q17	19	39	17	15	-0.937	-1.092	-1.256	-0.640	0.524	0.378	0.550	0.580	-0.473	0.183	0.854	0.233	1.014	0.741	1.063	1.121
SCL_Q18	19	39	17	15	-1.193	-0.606	-1.700	-0.455	0.524	0.378	0.550	0.580	0.181	-0.873	3.132	1.705	1.014	0.741	1.063	1.121
SPD_Q19	19	39	17	15	-0.418	-1.231	-0.798	-1.274	0.524	0.378	0.550	0.580	-0.963	1.214	0.106	1.496	1.014	0.741	1.063	1.121
SPD_Q20	19	39	17	15	-0.892	-1.030	-1.007	-0.665	0.524	0.378	0.550	0.580	0.511	-0.094	-0.425	0.851	1.014	0.741	1.063	1.121
SPD_Q21	19	39	17	15	-1.127	-0.876	-1.865	-0.433	0.524	0.378	0.550	0.580	0.152	-0.449	3.242	-1.545	1.014	0.741	1.063	1.121
SPD_Q22	19	39	17	15	-0.871	-1.291	-1.865	-1.474	0.524	0.378	0.550	0.580	0.003	0.912	3.242	2.086	1.014	0.741	1.063	1.121
SPD_Q23	19	39	17	15	-1.028	-0.854	-1.628	-0.446	0.524	0.378	0.550	0.580	0.132	-0.179	3.047	0.626	1.014	0.741	1.063	1.121
SPD_Q24	19	39	17	15	-1.264	-1.201	-1.153	1.792	0.524	0.378	0.550	0.580	0.579	1.079	0.651	2.625	1.014	0.741	1.063	1.121
SPD_Q25	19	39	17	15	-1.527	-0.748	-1.198	-0.455	0.524	0.378	0.550	0.580	1.646	-0.676	0.632	1.705	1.014	0.741	1.063	1.121
SPD_Q26	19	39	17	15	-0.980	-1.540	-1.628	-1.226	0.524	0.378	0.550	0.580	-0.416	2.230	3.047	2.310	1.014	0.741	1.063	1.121
SPD_Q27	19	39	17	15	-1.069	-1.282	-1.222	0.740	0.524	0.378	0.550	0.580	0.840	1.059	2.127	-1.022	1.014	0.741	1.063	1.121
SPD_Q28	19	39	17	15	-0.807	-1.249	-1.192	-0.627	0.524	0.378	0.550	0.580	-0.112	0.911	1.052	0.080	1.014	0.741	1.063	1.121
COM_Q29	19	39	17	15	-0.803	-1.198	-0.860	-1.193	0.524	0.378	0.550	0.580	-0.812	0.485	-0.277	1.525	1.014	0.741	1.063	1.121
COM_Q30	19	39	17	15	-0.982	-1.104	-0.956	-0.507	0.524	0.378	0.550	0.580	0.200	0.927	1.032	-0.907	1.014	0.741	1.063	1.121
COM_Q31	19	39	17	15	-0.318	-0.864	-0.469	-0.978	0.524	0.378	0.550	0.580	-1.253	-0.110	-1.111	0.989	1.014	0.741	1.063	1.121
COM_Q32	19	39	17	15	-0.518	-0.864	-0.504	-1.156	0.524	0.378	0.550	0.580	-0.385	-0.110	-0.419	3.335	1.014	0.741	1.063	1.121
COM_Q33	19	39	17	15	-0.993	-0.818	-0.921	1.159	0.524	0.378	0.550	0.580	-0.095	-0.129	0.563	-0.408	1.014	0.741	1.063	1.121
COM_Q34	19	39	17	15	-0.855	-1.053	-0.889	-0.672	0.524	0.378	0.550	0.580	-0.462	0.884	-0.400	1.243	1.014	0.741	1.063	1.121
Valid N	19	39	17	15																

Table 35: Skewness and Kurtosis for Company Size categorical variable

	N			Skewness						Kurtosis					
	Statistic			Statistic			Std. Error			Statistic			Std. Error		
	Company Size			Company Size			Company Size			Company Size			Company Size		
	Small Company	Medium Company	Large Company	Small Company	Medium Company	Large Company	Small Company	Medium Company	Large Company	Small Company	Medium Company	Large Company	Small Company	Medium Company	Large Company
SCP_Q6	30	8	52	-1.339	-1.171	-1.117	0.427	0.752	0.330	1.243	1.240	1.392	0.833	1.481	0.650
SCP_Q7	30	8	52	-1.402	-1.516	-1.409	0.427	0.752	0.330	1.942	1.786	1.792	0.833	1.481	0.650
SCP_Q8	30	8	52	-1.296	-0.813	-1.217	0.427	0.752	0.330	1.336	-0.492	1.002	0.833	1.481	0.650
SCP_Q9	30	8	52	-1.355	-1.602	-1.057	0.427	0.752	0.330	1.766	3.648	0.274	0.833	1.481	0.650
SCL_Q10	30	8	52	-1.320	-0.770	-1.118	0.427	0.752	0.330	2.396	0.017	0.505	0.833	1.481	0.650
SCL_Q11	30	8	52	0.259	-1.846	-1.249	0.427	0.752	0.330	-1.457	4.611	0.803	0.833	1.481	0.650
SCL_Q12	30	8	52	-0.454	-1.986	-1.478	0.427	0.752	0.330	0.445	4.849	2.836	0.833	1.481	0.650
SCL_Q13	30	8	52	-0.689	-1.026	-1.229	0.427	0.752	0.330	0.644	1.851	0.770	0.833	1.481	0.650
SCL_Q14	30	8	52	-0.926	-1.744	-0.795	0.427	0.752	0.330	1.042	4.640	-0.708	0.833	1.481	0.650
SCL_Q15	30	8	52	-1.056	-1.516	-1.339	0.427	0.752	0.330	0.358	1.786	1.526	0.833	1.481	0.650
SCL_Q16	30	8	52	-1.307	-0.182	-1.272	0.427	0.752	0.330	0.925	-2.190	1.125	0.833	1.481	0.650
SCL_Q17	30	8	52	-1.126	-0.164	-1.159	0.427	0.752	0.330	1.029	-2.347	0.446	0.833	1.481	0.650
SCL_Q18	30	8	52	-1.112	-0.347	-1.071	0.427	0.752	0.330	1.115	-1.596	0.182	0.833	1.481	0.650
SPD_Q19	30	8	52	-0.892	-1.159	-0.965	0.427	0.752	0.330	0.078	0.812	0.230	0.833	1.481	0.650
SPD_Q20	30	8	52	-0.929	-1.601	-0.989	0.427	0.752	0.330	0.512	2.915	-0.214	0.833	1.481	0.650
SPD_Q21	30	8	52	-1.328	-1.042	-1.224	0.427	0.752	0.330	1.164	-0.523	0.574	0.833	1.481	0.650
SPD_Q22	30	8	52	-0.814	0.277	-1.631	0.427	0.752	0.330	-0.677	-1.392	2.374	0.833	1.481	0.650
SPD_Q23	30	8	52	-0.812	-1.279	-1.164	0.427	0.752	0.330	-0.136	0.291	1.159	0.833	1.481	0.650
SPD_Q24	30	8	52	-0.926	-1.440	-1.364	0.427	0.752	0.330	1.339	3.500	1.339	0.833	1.481	0.650
SPD_Q25	30	8	52	-0.915	-1.171	-1.186	0.427	0.752	0.330	-0.043	0.268	0.766	0.833	1.481	0.650
SPD_Q26	30	8	52	-1.116	-1.440	-1.499	0.427	0.752	0.330	0.328	3.500	1.870	0.833	1.481	0.650
SPD_Q27	30	8	52	-0.557	-0.860	-1.517	0.427	0.752	0.330	0.512	-0.998	2.155	0.833	1.481	0.650
SPD_Q28	30	8	52	-0.822	-0.288	-1.275	0.427	0.752	0.330	-0.263	-1.746	1.159	0.833	1.481	0.650
COM_Q29	30	8	52	-0.912	-0.957	-1.047	0.427	0.752	0.330	0.202	-0.506	0.037	0.833	1.481	0.650
COM_Q30	30	8	52	-0.433	-1.602	-1.032	0.427	0.752	0.330	-0.427	3.648	0.321	0.833	1.481	0.650
COM_Q31	30	8	52	-0.537	-0.616	-0.798	0.427	0.752	0.330	-0.345	-1.646	-0.587	0.833	1.481	0.650
COM_Q32	30	8	52	-0.653	-0.553	-0.857	0.427	0.752	0.330	-0.558	-1.795	0.758	0.833	1.481	0.650
COM_Q33	30	8	52	-0.963	-0.770	-1.006	0.427	0.752	0.330	1.235	0.017	0.321	0.833	1.481	0.650
COM_Q34	30	8	52	-1.225	-0.361	-0.859	0.427	0.752	0.330	1.610	-1.666	0.003	0.833	1.481	0.650
Valid N	30	8	52												

Table 36: Winsorised data characteristics per question

	Mean		Interval for Mean		5% Trimmed Mean	Median	Variance	Std. Deviation	Minimum	Maximum	Range	Interquartile Range	Skewness		Kurtosis	
			Lower Bound	Upper Bound												
	Statistic	Std. Error	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
SCP_Q6	5.49	0.133	5.22	5.75	5.54	6.00	1.601	1.265	3	7	4	1	-0.723	0.254	-0.235	0.503
SCP_Q7	5.57	0.124	5.32	5.81	5.63	6.00	1.394	1.181	3	7	4	1	-0.938	0.254	0.340	0.503
SCP_Q8	5.41	0.135	5.14	5.68	5.46	5.50	1.638	1.280	3	7	4	1	-0.620	0.254	-0.396	0.503
SCP_Q9	5.48	0.132	5.21	5.74	5.53	6.00	1.578	1.256	3	7	4	1	-0.731	0.254	-0.203	0.503
SCL_Q10	5.43	0.128	5.18	5.69	5.48	6.00	1.484	1.218	3	7	4	1	-0.776	0.254	-0.067	0.503
SCL_Q11	5.51	0.115	5.28	5.74	5.57	6.00	1.197	1.094	3	7	4	1	-0.819	0.254	0.554	0.503
SCL_Q12	5.43	0.113	5.21	5.66	5.48	5.00	1.147	1.071	3	7	4	1	-0.721	0.254	0.534	0.503
SCL_Q13	5.60	0.128	5.35	5.85	5.67	6.00	1.479	1.216	3	7	4	1	-0.871	0.254	0.147	0.503
SCL_Q14	5.14	0.165	4.82	5.47	5.22	5.00	2.440	1.562	2	7	5	1	-0.879	0.254	-0.220	0.503
SCL_Q15	5.34	0.132	5.08	5.61	5.38	6.00	1.577	1.256	3	7	4	1	-0.683	0.254	-0.338	0.503
SCL_Q16	5.18	0.165	4.85	5.51	5.25	6.00	2.462	1.569	2	7	5	1	-0.962	0.254	-0.078	0.503
SCL_Q17	5.11	0.164	4.79	5.44	5.18	6.00	2.414	1.554	2	7	5	1	-0.906	0.254	-0.268	0.503
SCL_Q18	4.96	0.158	4.64	5.27	5.01	5.00	2.245	1.498	2	7	5	1	-0.824	0.254	-0.331	0.503
SPD_Q19	5.06	0.166	4.73	5.39	5.12	5.00	2.480	1.575	2	7	5	1	-0.676	0.254	-0.540	0.503
SPD_Q20	5.31	0.171	4.97	5.65	5.40	6.00	2.644	1.626	2	7	5	2	-0.969	0.254	-0.082	0.503
SPD_Q21	5.53	0.144	5.25	5.82	5.59	6.00	1.870	1.367	3	7	4	2	-0.827	0.254	-0.446	0.503
SPD_Q22	5.60	0.137	5.33	5.87	5.67	6.00	1.681	1.296	3	7	4	2	-0.858	0.254	-0.153	0.503
SPD_Q23	5.06	0.155	4.75	5.36	5.12	5.00	2.165	1.472	2	7	5	1	-0.790	0.254	-0.156	0.503
SPD_Q24	5.24	0.119	5.01	5.48	5.27	5.00	1.265	1.125	3	7	4	1	-0.693	0.254	0.089	0.503
SPD_Q25	5.16	0.130	4.90	5.41	5.17	5.00	1.526	1.235	3	7	4	1	-0.669	0.254	-0.531	0.503
SPD_Q26	5.27	0.126	5.02	5.52	5.30	5.00	1.434	1.197	3	7	4	1	-0.735	0.254	-0.202	0.503
SPD_Q27	5.40	0.122	5.16	5.64	5.44	5.00	1.344	1.159	3	7	4	1	-0.614	0.254	0.052	0.503
SPD_Q28	5.04	0.160	4.73	5.36	5.10	5.00	2.290	1.513	2	7	5	1	-0.833	0.254	-0.174	0.503
COM_Q29	5.11	0.165	4.78	5.44	5.18	6.00	2.437	1.561	2	7	5	1	-0.932	0.254	-0.208	0.503
COM_Q30	5.37	0.133	5.10	5.63	5.41	5.50	1.583	1.258	3	7	4	1	-0.625	0.254	-0.376	0.503
COM_Q31	4.83	0.171	4.49	5.17	4.87	5.00	2.635	1.623	2	7	5	3	-0.562	0.254	-0.884	0.503
COM_Q32	5.08	0.131	4.82	5.34	5.09	5.00	1.556	1.247	3	7	4	1	-0.363	0.254	-0.556	0.503
COM_Q33	5.18	0.132	4.92	5.44	5.20	5.00	1.564	1.250	3	7	4	1	-0.416	0.254	-0.519	0.503
COM_Q34	5.01	0.158	4.70	5.33	5.07	5.00	2.258	1.503	2	7	5	1	-0.791	0.254	-0.174	0.503

9.4 Appendix D – Data Analysis

9.4.1 Reliability

Table 37: Reliability of DT Scope scale

Cronbach's Alpha 0.881	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SCP_Q6	16.46	10.723	0.724	0.855
SCP_Q7	16.38	10.777	0.793	0.830
SCP_Q8	16.53	10.701	0.715	0.859
SCP_Q9	16.47	10.656	0.742	0.848

Table 38: Reliability of DT Scale scale

Cronbach's Alpha 0.914	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SCL_Q10	42.28	73.484	0.608	0.910
SCL_Q11	42.20	73.263	0.705	0.905
SCL_Q12	42.28	73.461	0.711	0.905
SCL_Q13	42.11	73.943	0.586	0.912
SCL_Q14	42.57	69.911	0.586	0.914
SCL_Q15	42.37	70.504	0.739	0.902
SCL_Q16	42.53	65.285	0.786	0.898
SCL_Q17	42.60	64.804	0.817	0.895
SCL_Q18	42.76	65.468	0.823	0.895

Table 39: Reliability of DT Speed scale

Cronbach's Alpha 0.924	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SPD_Q19	47.61	86.712	0.740	0.915
SPD_Q20	47.36	87.670	0.676	0.919
SPD_Q21	47.13	89.982	0.734	0.915
SPD_Q22	47.07	89.861	0.788	0.912
SPD_Q23	47.61	87.139	0.786	0.912
SPD_Q24	47.42	95.393	0.648	0.919
SPD_Q25	47.51	93.781	0.652	0.919
SPD_Q26	47.40	92.804	0.722	0.916
SPD_Q27	47.27	92.220	0.779	0.913
SPD_Q28	47.62	90.328	0.636	0.921

Table 40: Reliability of SA scale

Cronbach's Alpha 0.887	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
COM_Q29	25.47	32.162	0.648	0.877
COM_Q30	25.21	35.786	0.578	0.885
COM_Q31	25.74	29.361	0.800	0.850
COM_Q32	25.50	33.826	0.737	0.863
COM_Q33	25.40	34.243	0.701	0.868
COM_Q34	25.57	30.922	0.771	0.855

9.4.2 Exploratory Factor Analysis

Table 41: DT Scope correlation matrix

		SCP_Q6	SCP_Q7	SCP_Q8	SCP_Q9
Correlation	SCP_Q6	1.000	0.775	0.561	0.587
	SCP_Q7	0.775	1.000	0.625	0.656
	SCP_Q8	0.561	0.625	1.000	0.708
	SCP_Q9	0.587	0.656	0.708	1.000
Sig. (1-tailed)	SCP_Q6		0.000	0.000	0.000
	SCP_Q7	0.000		0.000	0.000
	SCP_Q8	0.000	0.000		0.000
	SCP_Q9	0.000	0.000	0.000	

a. Determinant = .100

Table 42: DT Scope KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling		0.781
Bartlett's Test of Sphericity	Approx.	200.272
	df	6
	Sig.	0.000

Table 43: DT Scope total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.957	73.935	73.935	2.957	73.935	73.935
2	0.536	13.388	87.323			
3	0.291	7.268	94.591			
4	0.216	5.409	100.000			

Extraction Method: Principal Component Analysis.

Table 44: DT Scale correlation matrix

		SCL_Q10	SCL_Q11	SCL_Q12	SCL_Q13	SCL_Q14	SCL_Q15	SCL_Q16	SCL_Q17	SCL_Q18
Correlation	**SCL_Q10**	1.000	0.591	0.509	0.323	0.415	0.496	0.512	0.503	0.515
	SCL_Q11	0.591	1.000	0.624	0.392	0.535	0.484	0.601	0.548	0.624
	SCL_Q12	0.509	0.624	1.000	0.437	0.506	0.640	0.555	0.572	0.607
	SCL_Q13	0.323	0.392	0.437	1.000	0.498	0.452	0.509	0.529	0.520
	SCL_Q14	0.415	0.535	0.506	0.498	1.000	0.433	0.416	0.466	0.497
	SCL_Q15	0.496	0.484	0.640	0.452	0.433	1.000	0.653	0.688	0.713
	SCL_Q16	0.512	0.601	0.555	0.509	0.416	0.653	1.000	0.835	0.725
	SCL_Q17	0.503	0.548	0.572	0.529	0.466	0.688	0.835	1.000	0.808
	SCL_Q18	0.515	0.624	0.607	0.520	0.497	0.713	0.725	0.808	1.000
Sig. (1-tailed)	**SCL_Q10**		0.000	0.000	0.001	0.000	0.000	0.000	0.000	0.000
	SCL_Q11	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SCL_Q12	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	SCL_Q13	0.001	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	SCL_Q14	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000
	SCL_Q15	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	SCL_Q16	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	SCL_Q17	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	SCL_Q18	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

a. Determinant = .003

Table 45: DT Scale KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling		0.895
Bartlett's Test of Sphericity	Approx. Chi-Square	505.775
	df	36
	Sig.	0.000

Table 46: DT Scale total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.434	60.380	60.380	5.434	60.380	60.380
2	0.791	8.792	69.172			
3	0.756	8.405	77.578			
4	0.509	5.659	83.236			
5	0.451	5.015	88.251			
6	0.410	4.556	92.807			
7	0.279	3.102	95.909			
8	0.240	2.664	98.573			
9	0.128	1.427	100.000			

Extraction Method: Principal Component Analysis.

Table 47: DT Speed correlation matrix

		SPD_Q19	SPD_Q20	SPD_Q21	SPD_Q22	SPD_Q23	SPD_Q24	SPD_Q25	SPD_Q26	SPD_Q27	SPD_Q28
Correlation	**SPD_Q19**	1.000	0.735	0.597	0.655	0.566	0.398	0.382	0.588	0.566	0.607
	SPD_Q20	0.735	1.000	0.622	0.609	0.519	0.376	0.362	0.494	0.535	0.456
	SPD_Q21	0.597	0.622	1.000	0.743	0.622	0.455	0.509	0.461	0.637	0.466
	SPD_Q22	0.655	0.609	0.743	1.000	0.701	0.515	0.502	0.533	0.653	0.530
	SPD_Q23	0.566	0.519	0.622	0.701	1.000	0.623	0.675	0.629	0.672	0.514
	SPD_Q24	0.398	0.376	0.455	0.515	0.623	1.000	0.708	0.543	0.570	0.462
	SPD_Q25	0.382	0.362	0.509	0.502	0.675	0.708	1.000	0.572	0.670	0.345
	SPD_Q26	0.588	0.494	0.461	0.533	0.629	0.543	0.572	1.000	0.643	0.607
	SPD_Q27	0.566	0.535	0.637	0.653	0.672	0.570	0.670	0.643	1.000	0.509
	SPD_Q28	0.607	0.456	0.466	0.530	0.514	0.462	0.345	0.607	0.509	1.000
Sig. (1-tailed)	**SPD_Q19**		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SPD_Q20	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SPD_Q21	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000	0.000
	SPD_Q22	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000	0.000
	SPD_Q23	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000	0.000
	SPD_Q24	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000	0.000
	SPD_Q25	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000	0.000
	SPD_Q26	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000	0.000
	SPD_Q27	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		0.000
	SPD_Q28	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	

a. Determinant = .001

Table 48: DT Speed KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling		0.907
Bartlett's Test of Sphericity	Approx. Chi-Square	593.569
	df	45
	Sig.	0.000

Table 49: DT Speed total variance explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Sums of
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	6.049	60.487	60.487	6.049	60.487	60.487	5.246
2	1.066	10.655	71.142	1.066	10.655	71.142	4.702
3	0.719	7.190	78.332				
4	0.468	4.682	83.014				
5	0.419	4.187	87.201				
6	0.335	3.353	90.555				
7	0.266	2.657	93.212				
8	0.255	2.547	95.759				
9	0.237	2.365	98.125				
10	0.188	1.875	100.000				

Table 50: SPD Component correlation matrix

Component	1	2
1	1.000	0.574
2	0.574	1.000

Extraction Method: Principal Component

Table 51: DT Speed factor loading

	Component	
	1	2
SPD_Q19	0.951	
SPD_Q20	0.934	
SPD_Q22	0.699	
SPD_Q21	0.692	
SPD_Q28	0.644	
SPD_Q25		0.967
SPD_Q24		0.883
SPD_Q23		0.613
SPD_Q27		0.566
SPD_Q26		0.489

Extraction Method: Principal Component Analysis.

Table 52: SA correlation matrix

		COM_Q29	COM_Q30	COM_Q31	COM_Q32	COM_Q33	COM_Q34
Correlation	**COM_Q29**	1.000	0.425	0.566	0.451	0.652	0.560
	COM_Q30	0.425	1.000	0.564	0.483	0.401	0.515
	COM_Q31	0.566	0.564	1.000	0.733	0.629	0.692
	COM_Q32	0.451	0.483	0.733	1.000	0.546	0.731
	COM_Q33	0.652	0.401	0.629	0.546	1.000	0.585
	COM_Q34	0.560	0.515	0.692	0.731	0.585	1.000
Sig. (1-tailed)	**COM_Q29**		0.000	0.000	0.000	0.000	0.000
	COM_Q30	0.000		0.000	0.000	0.000	0.000
	COM_Q31	0.000	0.000		0.000	0.000	0.000
	COM_Q32	0.000	0.000	0.000		0.000	0.000
	COM_Q33	0.000	0.000	0.000	0.000		0.000
	COM_Q34	0.000	0.000	0.000	0.000	0.000	

Table 53: SA KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling		0.864
Bartlett's Test of Sphericity	**Approx. Chi-Square**	288.470
	df	15
	Sig.	0.000

Table 54: SA total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.866	64.426	64.426	3.866	64.426	64.426
2	0.693	11.546	75.971			
3	0.579	9.644	85.616			
4	0.349	5.819	91.435			
5	0.289	4.819	96.254			
6	0.225	3.746	100.000			

Extraction Method: Principal Component Analysis.

Table 55: Composite EFA factor loadings

	Component			
	1	2	3	4
SCP_Q6		0.959		
SCP_Q7		0.855		
SCP_Q8		0.698		
SCP_Q9		0.680		
SCL_Q12				0.441
SCL_Q13				0.781
SCL_Q14				0.849
SCL_Q15		0.369		0.451
SPD_Q19			0.651	
SPD_Q20			0.603	
SPD_Q21			0.533	
SPD_Q22	0.405		0.552	
SPD_Q23	0.679			
SPD_Q24	0.772			
SPD_Q25	0.739			
SPD_Q26	0.592			
SPD_Q27	0.702			
COM_Q30	0.692			
COM_Q31	0.638		0.356	
COM_Q32	0.777			
COM_Q34	0.815			

Extraction Method: Principal Component Analysis.

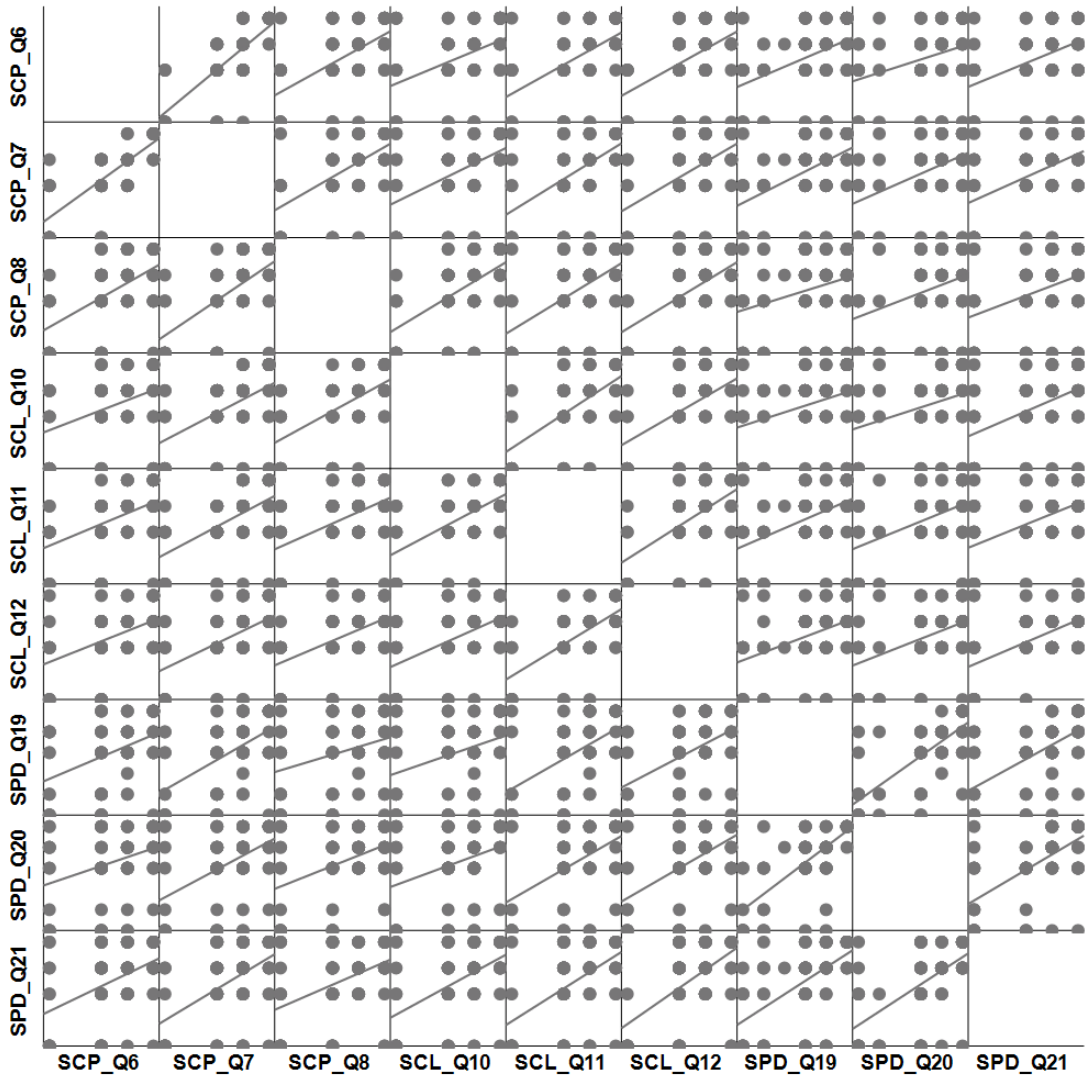


Figure 16: Variable scatter plot matrix

9.4.3 Confirmatory Factor Analysis

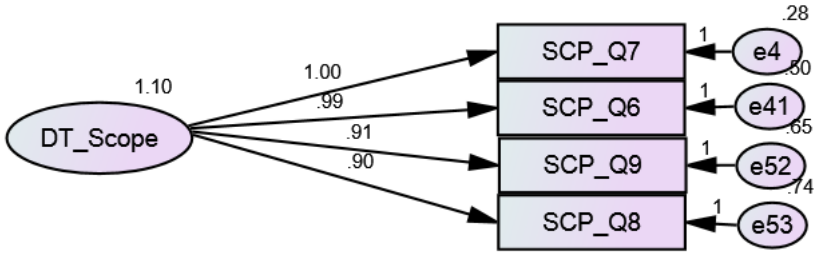


Figure 17: Digital scope CFA model

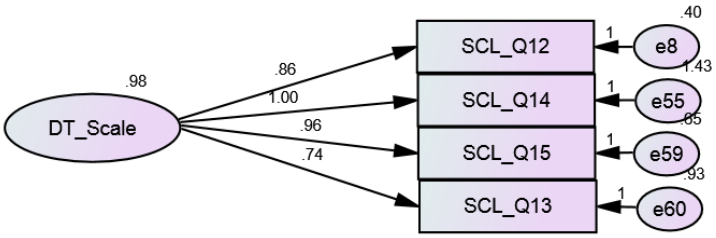


Figure 18: Digital scale CFA model

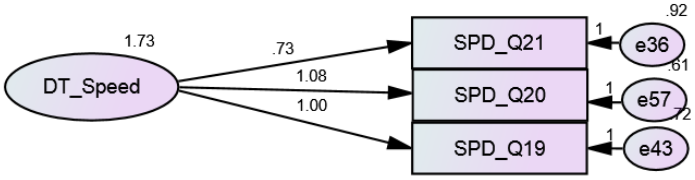


Figure 19: Digital speed CFA model

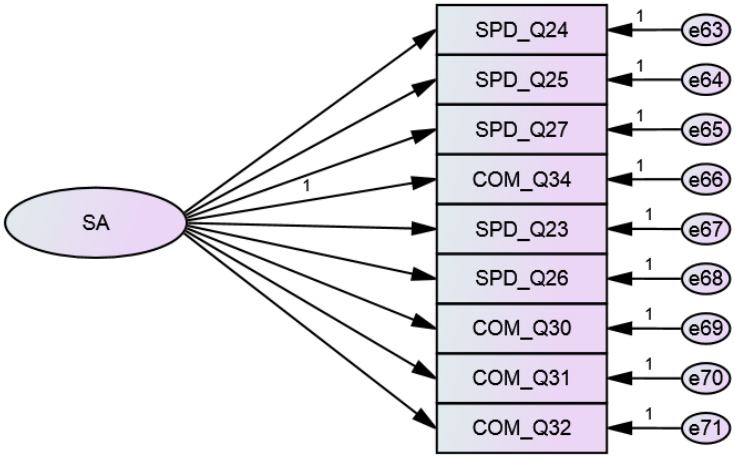


Figure 20: Strategic agility CFA model

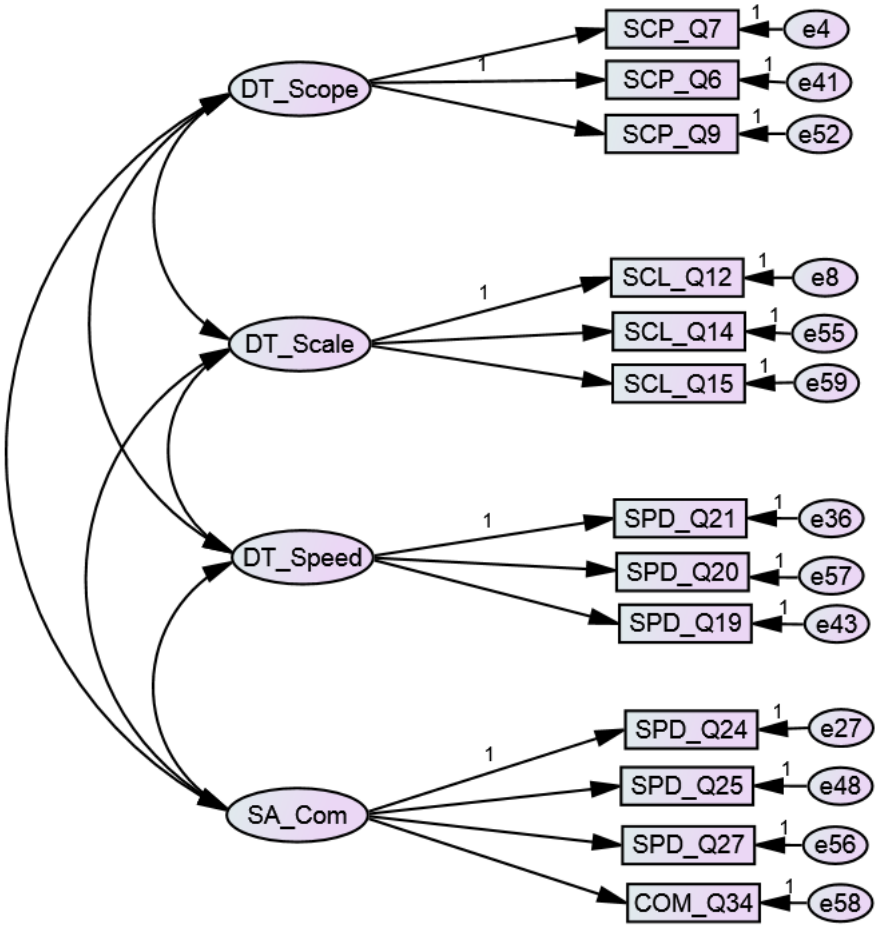


Figure 21: Optimised first order factor CFA model

Table 56: CFA late measured variable loading per construct

Item		Construct	Loading
SCL_Q12	<---	DT_Scale	0.843
SCL_Q14	<---	DT_Scale	0.571
SCL_Q15	<---	DT_Scale	0.77
SCP_Q7	<---	DT_Scope	0.92
SCP_Q6	<---	DT_Scope	0.826
SCP_Q9	<---	DT_Scope	0.731
SPD_Q21	<---	DT_Speed	0.778
SPD_Q19	<---	DT_Speed	0.834
SPD_Q20	<---	DT_Speed	0.819
SPD_Q24	<---	SA_Com	0.766
SPD_Q25	<---	SA_Com	0.806
SPD_Q27	<---	SA_Com	0.824
COM_Q34	<---	SA_Com	0.732

Table 57: CFA construct correlation

Construct		Construct	Correlation
DT_Scope	<-->	DT_Scale	0.728
DT_Scope	<-->	DT_Speed	0.672
DT_Scope	<-->	SA_Com	0.622
DT_Scale	<-->	DT_Speed	0.707
DT_Scale	<-->	SA_Com	0.724
SA_Com	<-->	DT_Speed	0.737

9.4.4 Extracted factor descriptive statistics

Table 58: Extracted construct descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
F2_SCP_Q6	90	3	7	5.49	1.265	-0.723	0.254	-0.235	0.503
F2_SCP_Q7	90	3	7	5.57	1.181	-0.938	0.254	0.340	0.503
F2_SCP_Q9	90	3	7	5.48	1.256	-0.731	0.254	-0.203	0.503
F4_SCL_Q12	90	3	7	5.43	1.071	-0.721	0.254	0.534	0.503
F4_SCL_Q14	90	2	7	5.14	1.562	-0.879	0.254	-0.220	0.503
F4_SCL_Q15	90	3	7	5.34	1.256	-0.683	0.254	-0.338	0.503
F3_SPD_Q19	90	2	7	5.06	1.575	-0.676	0.254	-0.540	0.503
F3_SPD_Q20	90	2	7	5.31	1.626	-0.969	0.254	-0.082	0.503
F3_SPD_Q21	90	3	7	5.53	1.367	-0.827	0.254	-0.446	0.503
F1_SPD_Q24	90	3	7	5.24	1.125	-0.693	0.254	0.089	0.503
F1_SPD_Q25	90	3	7	5.16	1.235	-0.669	0.254	-0.531	0.503
F1_SPD_Q27	90	3	7	5.40	1.159	-0.614	0.254	0.052	0.503
F1_COM_Q34	90	2	7	5.01	1.503	-0.791	0.254	-0.174	0.503
Valid N (listwise)	90								

9.4.5 Regression Analysis

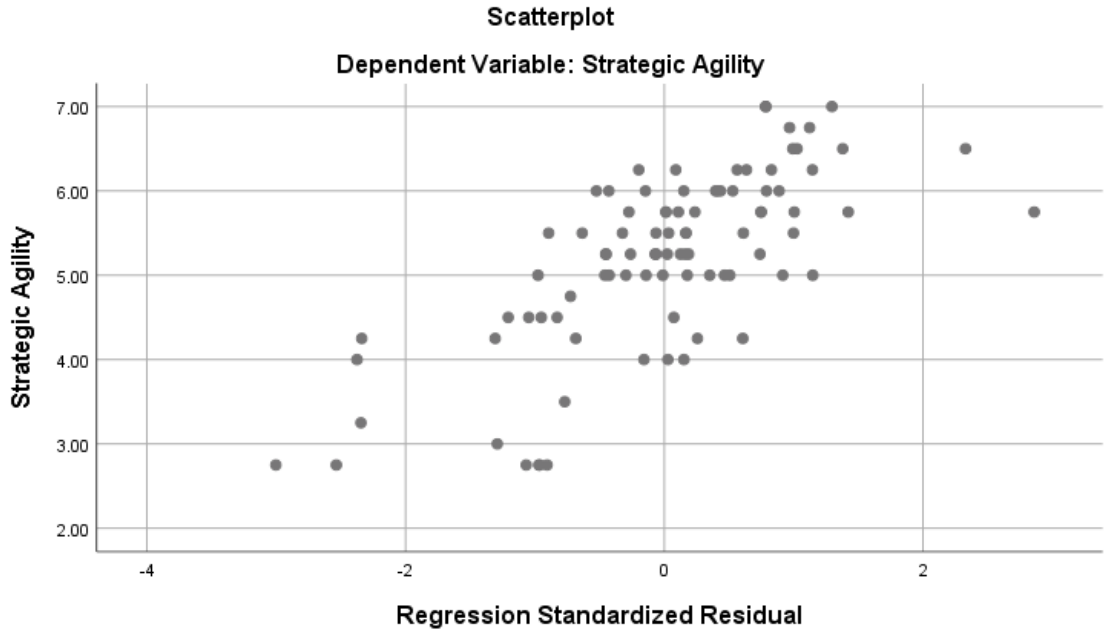


Figure 22: Homoscedasticity - dependent variable as a function of the standardised residuals

Table 59: Stepwise regression model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	0.634	0.402	0.395	0.82078	0.402	59.120	1	88	0.000
2	0.682	0.466	0.453	0.78018	0.064	10.397	1	87	0.002
3	0.703	0.494	0.476	0.76389	0.028	4.752	1	86	0.032

Table 60: Stepwise regression model ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	39.828	1	39.828	59.120	0.000
	Residual	59.284	88	0.674		
	Total	99.112	89			
2	Regression	46.156	2	23.078	37.915	0.000
	Residual	52.956	87	0.609		
	Total	99.112	89			
3	Regression	48.929	3	16.310	27.950	0.000
	Residual	50.183	86	0.584		
	Total	99.112	89			

Table 61: Stepwise regression model coefficients

Model	Construct	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	2.551	0.356		7.176	0.000					
	Speed of Digital Transformation	0.500	0.065	0.634	7.689	0.000	0.634	0.634	0.634	1.000	1.000
2	(Constant)	1.649	0.439		3.757	0.000					
	Speed of Digital Transformation	0.359	0.076	0.455	4.731	0.000	0.634	0.452	0.371	0.665	1.503
	Scope of Digital Transformation	0.300	0.093	0.310	3.224	0.002	0.573	0.327	0.253	0.665	1.503
3	(Constant)	1.272	0.463		2.747	0.007					
	Speed of Digital Transformation	0.296	0.080	0.375	3.722	0.000	0.634	0.372	0.286	0.579	1.728
	Scope of Digital Transformation	0.217	0.099	0.224	2.195	0.031	0.573	0.230	0.168	0.566	1.767
	Scale of Digital Transformation	0.220	0.101	0.223	2.180	0.032	0.573	0.229	0.167	0.565	1.770

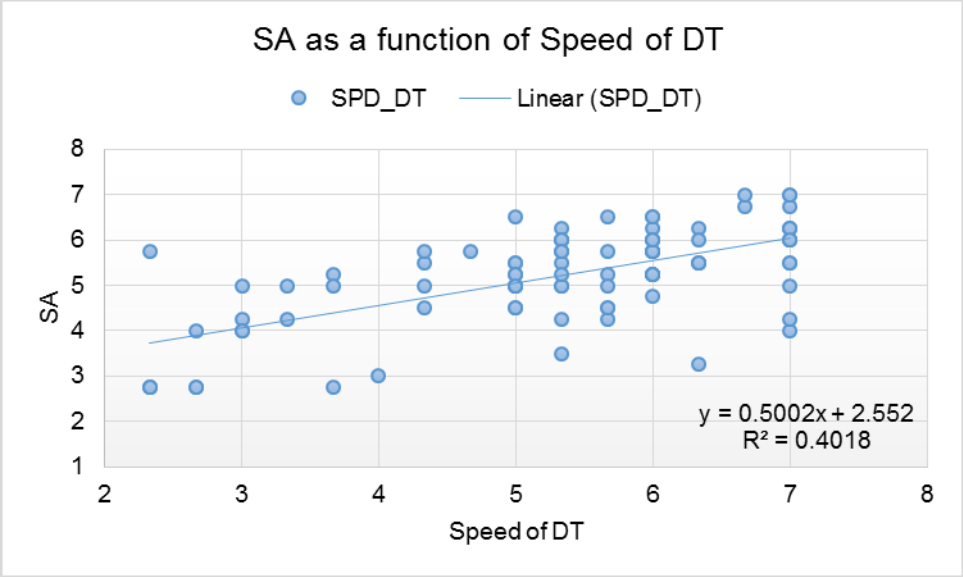


Figure 23: Partial plot of SA as a function of Speed of DT

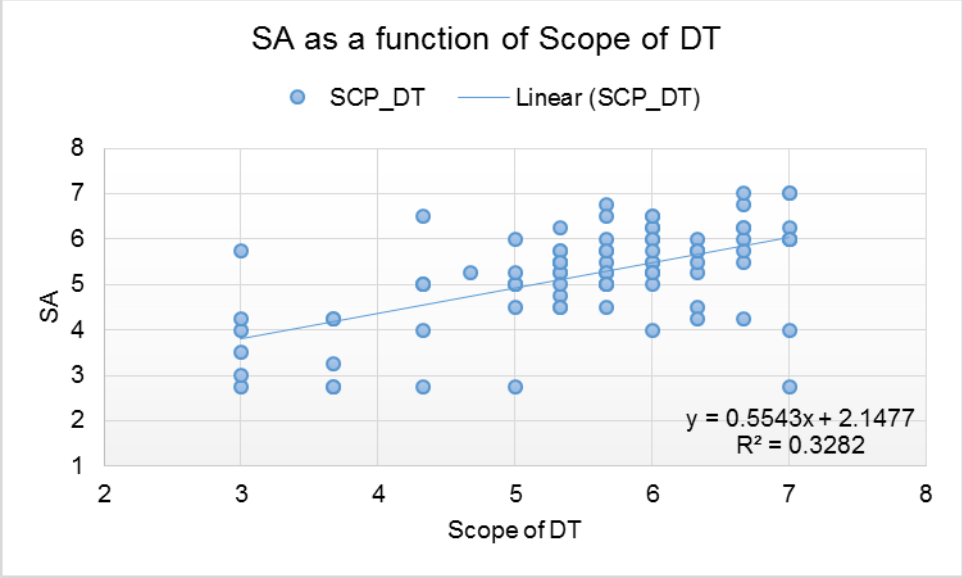


Figure 24: Partial plot of SA as a function of Scope of DT

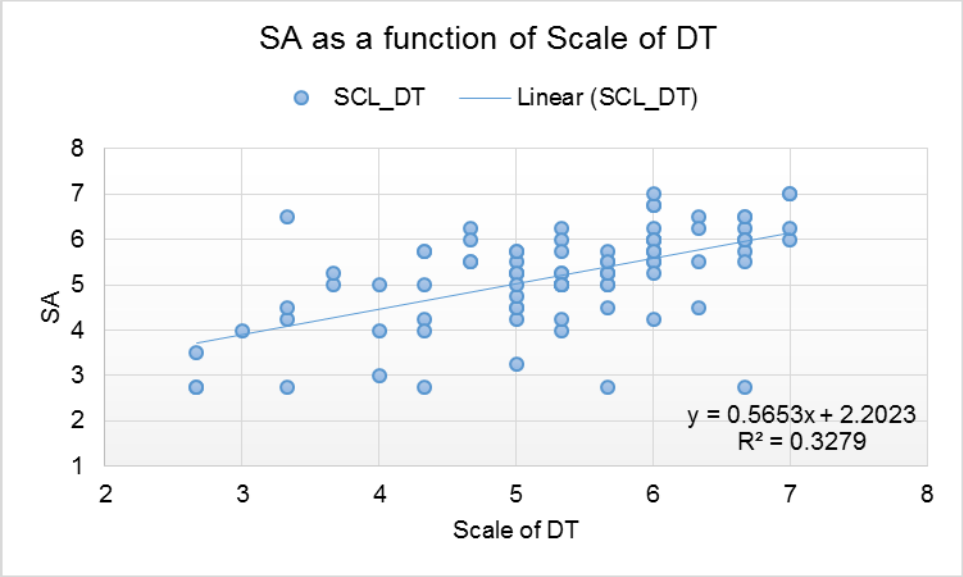


Figure 25: Partial plot of SA as a function of Scale of DT