



Yanjun Gao

RE-EXAMINING DYNAMIC CAPABILITIES IN THE CONTEXT OF
DIGITAL TRANSFORMATION

SCHOOL OF MANAGEMENT

PhD in Leadership and Management
Academic Year: 2017 - 2022

Supervisor: Prof. Vasilis Theoharakis
Associate Supervisor: Prof. Stan Maklan
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ABSTRACT

While digital transformation is often a necessity to allow incumbent firms to remain competitive in a fast-changing world, it suffers from high failure rates in practice. The dynamic capability perspective was developed to address rapidly changing environments, so it can be utilised as a theoretical foundation to improve our understanding of digital transformation. With dynamic capabilities often disaggregated into three capability clusters: sensing, seizing, and transforming, these clusters are mostly presented in a static sequence and evolve independently, which is a practice challenged by this thesis.

To explore the possible reasons hindering digital transformation, a longitudinal case study is conducted, exploring the evolution of dynamic capability clusters over time. It is observed that sensing, seizing, and transforming, rather than being sequential, coexist and coevolve during digital transformation. When they evolve at different speeds, mismatches can occur, which can act as bottlenecks slowing down the transformation but at the same time can act as catalysts improving underdeveloped capabilities. This finding contributes to the theory by demonstrating how mismatches arise during the coevolution of dynamic capability clusters and discussing their consequences for digital transformation. This finding also contributes to practice by arguing that the way in which firms orchestrate the coevolution of these dynamic capabilities over time holds a key to successful digital transformation, providing a more dynamic approach for emergent strategy development. It is therefore suggested that managers embrace the tensions caused by these mismatches and adopt a mindset that allows them to concurrently improve different dynamic capability clusters supporting digital transformation.

While dynamic capabilities were introduced to address the static nature of the resource-based view (RBV), as previously described, the sensing, seizing, and transforming clusters are often applied in a sequential fashion, ignoring their possible interdependencies and evolutionary paths, and thus failing to capture the essential dynamism of the underlying phenomenon, which is particularly important in a high-velocity digital context. Therefore, this study further developed

the conceptualisation of dynamic capability from an evolutionary perspective, better serving the current digital environment, which is changing faster than ever.

As regards future research, firstly, since this thesis advances the conceptualisation of sensing, seizing, and transforming capabilities from an evolutionary perspective, it needs to be validated by more empirical studies. Secondly, the context is a limitation of this thesis. While this thesis provides deep insights through a single longitudinal case study in the retail sector, more studies are called for in diverse industries and national contexts to examine the coevolution of dynamic capabilities over time. Thirdly, while this thesis observes the mismatches during the coevolution of dynamic capabilities, further research is needed to explore the fundamental reasons behind this observation. The potential reasoning assumptions proposed by this thesis in attempting to explain the fundamental mechanism of dynamic capability mismatches require further examination via empirical research. Fourthly, an evolutionary underpinning indicates the methodological implications, calling for a longitudinal research design that moves away from a serial view in order to further advance and validate the framework of sensing, seizing, and transforming.

Keywords:

Seizing; Transforming; Digital Transformation; Digitalisation; Evolutionary Perspective; Evolutionary Theory; Longitudinal Research; Case Study; Retailing Sector

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
BCG	Boston Consulting Group
B&M	Brick and Mortar
CDP	Customer Data Platform
CIO	Chief Information Officer
CRM	Customer Relationship Management
DC	Dynamic Capability
DT	Digital Transformation
ENIAC	Electronic Numerical Integrator and Computer
GM	General Manager
ICT	Information and Communications Technology
IT	Information Technology
KMCG	Klynveld Peat Marwick Goerdeler
KPI	Key Performance Indicator
P&L	Profit and Loss
RBV	Resource-Based View
ROI	Return on Investment
R&D	Research and Development
UPS	Unique Selling Proposition
VRIN	Valuable, Rare, Imperfectly, Imitable, and Non-substitutable

1 INTRODUCTION

1.1 Research Background

The ongoing advancement of technology has changed human behaviours, habits, and lifestyles throughout the majority of the world, and consequently has had a great impact on the current business environment. New businesses, such as digital media, online retailers, and telecommunications, have benefited from the developments in technology. Their successes have had a disruptive effect on their related markets, and therefore, these companies can be referred to as disruptors (Wade and Vivier, 2018). In comparison, legacy companies can be referred to as incumbents (Verhoef *et al.*, 2021). Many incumbents, operating with traditional approaches in the affected sectors, have suffered from digital disruption.

1.2 Research Rationale

1.2.1 Personal Rationale

Having an educational background in technology and psychology, my PhD journey started from working in brand and marketing consultancy for over six years. I experienced the radical digital change in marketing and supported a number of companies to transform their marketing approaches from traditional media to digital media. I was also aware that, following the digital trend, many companies started to invest in technology and big data but rarely knew how to make these investments work effectively for them, so they rarely achieved the expected benefits from their investments.

With a strong interest in business digitalisation and experience in marketing and media, I came to Cranfield for further education – an MSc in strategic marketing. Based on my study and reading, I started to become very passionate about gaining more understanding of big data in business. A London study trip about Artificial Intelligence (AI) in business motivated me to pursue research in a related area. I had an opportunity to discuss this with Stan Maklan, Professor of Marketing and Technology, in terms of how I could integrate my background regarding business, technology, and psychology for my future career.

After finishing my Master's degree, I successfully applied to a call for PhD applications in the digital transformation of marketing led by Prof. Stan Maklan.

The literature highlighted both the opportunity and the challenge that big data, ICT, Information and Communications Technology can bring to business (Chen, Chiang and Storey, 2012). Benefiting from efficient and advanced data transformation, big data can be developed as a new type of capital for businesses in the future (Erevelles, Fukawa and Swayne, 2016). A massive amount (volume) of customer information can be collected in real-time (velocity) from various channels in various types (variety) (Erevelles, Fukawa and Swayne, 2016). However, technically, big data also has its limitations, since it contains unimportant and irrelevant data that dates quickly; it is unstructured and so needs to be organised and analysed carefully (Erevelles, Fukawa and Swayne, 2016). Scholars and practitioners are looking to extract value from the data whilst not getting lost in vast quantities of it. Therefore, this is an opportunity but also a challenge for businesses.

At the initial reading stage, I was very much influenced by Prof. Stan Maklan's work in this area and started to be aware of the failure of actual returns from business investments in technology. In terms of CRM, as an example of previous technology-enabled-marketing investment, only one out of fifteen organisations indicates that it improves business performance (Maklan, Peppard and Klaus, 2015). Although \$220 billion were invested in CRM solutions from 2000 to 2005, 55% to 75% of the programmes failed to meet the expected return, and \$150 billion were wasted (Maklan, Peppard and Klaus, 2015). This indicates that the benefits for both organisations and customers from technology investments are not always realised as expected, and there is an urgent need to understand the reason behind this. Therefore, I started my PhD journey with a particular interest in understanding the difficulties of digital transformation.

After exploring digital transformation for a year during my PhD, I was eager to find an appropriate theory to unpack the digital transformation phenomenon. I began to explore the literature on organisational theory and how it related to marketing: for example, resource dependence (Anderson, 1982; Macedo and

Pinho, 2006; Connelly, Ketchen and Slater, 2011), contingency theory (Zeithaml, Varadarajan and Zeithaml, 1988), institutional theory (Zeithaml, Varadarajan and Zeithaml, 1988), and the resource-based view (RBV) of the firm (E. Prescott, 2016; Braganza *et al.*, 2017; Wang and Hajli, 2017). I finally decided that dynamic capabilities could be the theoretical foundation of digital transformation that I had been looking for.

1.2.2 Academic Rationale

Technological change is generating digital disruption for incumbents (Agarwal *et al.*, 2010; Ansari, Garud and Kumaraswamy, 2016; Reinartz, Wiegand and Imschloss, 2019). In response, many incumbents are engaging in their own digital transformation (Andal-Ancion, Cartwright and Yip, 2003; Sebastian *et al.*, 2017; Kammerlander, König and Richards, 2018), to remain competitive (Vial, 2019; Verhoef *et al.*, 2021). However, while digital transformation is often a necessity to allow incumbent firms to remain competitive in a fast-changing digital world, in practice, it suffers from high failure rates. For example, McKinsey (2018) finds that the success rate of digital transformation is consistently low (less than 30%), and Boston Consulting Group (BCG) reports that the success of digital transformations is rare, with 70% of organisations failing to achieve their objectives (Forth *et al.*, 2020). A global CIO Survey from Harvey Nash and KPMG (White and Bates, 2020) shows that 55% of companies increased their IT investment in 2020, compared to 25% in 2009. Arguably, the COVID-19 pandemic has made digital transformation even more urgent and essential (KPMG, 2020; McKinsey, 2020; Althoff, 2021). BCG (Forth *et al.*, 2020) reports that over 80% of companies plan to accelerate their digital transformation. Nonetheless, the low success rates (e.g., McKinsey, 2018; Forth *et al.*, 2020) indicate the challenges of realising value from digital transformation projects. With an increased urgency to digitally transform, it is critically important to understand the challenges incumbents face when engaging in digital transformation.

Dynamic capabilities, an extension of the RBV (Barney, 1991), were initially defined as “the firm’s ability to integrate, build, and reconfigure internal

and external competencies to address rapidly changing environments” (Teece, Pisano and Shuen, 1997, p. 516), and later re-defined as “the capacity of an organisation to purposefully create, extend, or modify its resource base” (Helfat *et al.*, 2007, p. 1). Comparably, digital transformation is a process of continuous change in response to digital disruptions from the business environment (Vial, 2019), and can be framed as a resource-based process that responds to technological changes as it leverages digital resources (Bharadwaj *et al.*, 2013), and realigns existing resources with digital strategies (Yeow, Soh and Hansen, 2018). Therefore, a dynamic capabilities approach could be an appropriate theoretical foundation for improving the understanding of digital transformation (Shamim *et al.*, 2019; Vial, 2019; Coreynen *et al.*, 2020). Dynamic capabilities can be disaggregated into three capability clusters (Teece, 2007; Teece, Peteraf and Leih, 2016): sensing, seizing, and transforming (or reconfiguring). These clusters help scholars to operationalise the dynamic capabilities concept when framing their research. I use these three dynamic capability clusters as a framework for this study to unpack the phenomenon of digital transformation.

The dynamic level of market context can make a big difference to the nature of dynamic capability. Eisenhardt and Martin (2000) believe that the traditional RBV reaches a boundary condition in high-velocity markets and the patterns of dynamic capabilities vary depending on market dynamism. In moderately dynamic markets, industry structures are relatively stable, and the market boundaries are relatively clear. Since this type of industry does not evolve rapidly, and changes are broadly predictable, variations can be applied in the current situation and extended to related new ones. Thus, dynamic capabilities rely heavily on existing knowledge, learning before doing, in moderately dynamic markets. In high-velocity markets, learning can be very fast, and selection becomes crucial to determine what to implement and in what order. Selection is based on fast learning, creates path dependencies, and plays an important role for dynamic capabilities. In other words, learning by doing is crucial in high-velocity markets. If one accepts that the current digital business context is a highly dynamic market, the traditional conceptualisation of the three disaggregated

dynamic capability clusters can be re-examined and advanced in the high-velocity digital context.

This thesis utilises the dynamic capability perspective to examine the phenomenon of digital transformation. Firstly, digital transformation needs to be better understood due to its high failure rate in practice. Secondly, the dynamic capability perspective provides an appropriate theoretical foundation. Sensing, seizing, and transforming capabilities offer a framework to operationalise the dynamic capability perspective in the context of digital transformation. Thirdly, due to the high-velocity nature of the digital market, the conventional conceptualisation of dynamic capabilities in terms of sensing, seizing, and transforming could possibly be reviewed and further developed in this rapidly changing business environment.

Therefore, the research question of the thesis is:

How can the dynamic capability perspective evolve to better understand digital transformation?

1.3 Research Aim and Objectives

The aim of this research is to re-examine and advance the conventional conceptualisation of dynamic capabilities in terms of sensing, seizing, and transforming in the context of digital transformation in order to better serve the current, rapidly changing digital context.

In order to achieve this research aim, the three objectives of the thesis are as follows:

Objective 1 (Literature Review): Review digital transformation as the context and dynamic capability perspective as the theoretical foundation.

Objective 2 (Empirical Paper): Examine the possible reasons hindering digital transformation from a dynamic capability perspective using the framework of sensing, seizing, and transforming through a longitudinal case study.

Objective 3 (Empirical Paper): Advance the framework of sensing, seizing, and transforming capabilities to better serve the high-velocity digital context through conceptual research.

1.4 Overview of Research Design

1.4.1 Research Design

Firstly, the literature review explores the concept of digital transformation (i.e., the definition and process of digital transformation) and the dynamic capability perspective (i.e., the origin, concept, and hierarchies of dynamic capabilities, and the disaggregated sensing, seizing, and transforming capabilities). Digital transformation as a special context for dynamic capability research is then discussed. This provides the deep theoretical knowledge required to conduct the following empirical study and conceptual research.

Secondly, since dynamic capabilities address external changes dynamically, longitudinal studies are appropriate to examine the evolution of dynamic abilities (Easterby-Smith, Lyles and Peteraf, 2009). Therefore, the empirical research is conducted as a longitudinal (Pettigrew, 1990) case study (Yin, 2014) to allow for a deep understanding of the evolution of sensing, seizing, and transforming capabilities over time during digital transformation.

1.4.2 Research Context

The digital vortex (Loucks *et al.*, 2016) is an analogy for the disruptive effect of the digital business environment (Figure 1-1). Businesses closer to the centre of the vortex have core products or services that can be digitalised, and therefore, they are affected by the digital disruption earlier and more severely. The survival of such businesses is reliant on their ability to digitally transform and adapt to the changing environment. The position of sectors within the vortex moves over time, with the general trend being to move closer to the centre as the digital business environment broadens and matures. Companies closer to the edge of the vortex should also be vigilant, as the digital threat can come either directly from competitors within the industry or from unexpected new digital sectors.

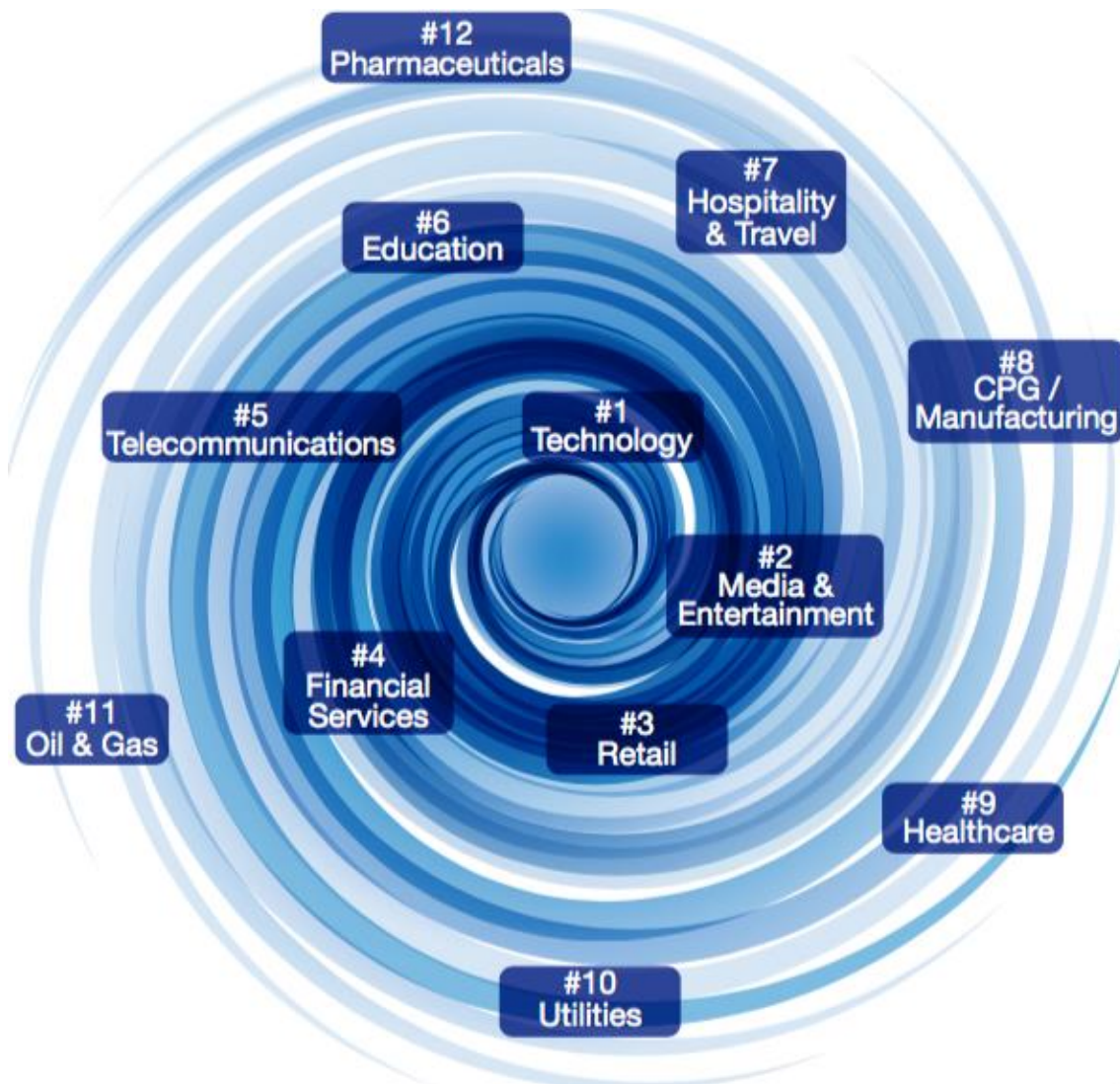


Figure 1-1 Digital vortex: digital disruption by industry in 2015 (Loucks *et al.*, 2016)

As shown in Figure 1-1, retail was the third closest sector to the centre of the digital vortex in 2015 (Loucks *et al.*, 2016). It has moved much closer to the centre as online retail has developed in recent years (Yokoi *et al.*, 2019). In this growing digital business environment, many traditional brick and mortar (B&M) retailers have started their online businesses by launching their own websites or partnering with third-party online platforms as a response to the digital disruption. However, this does not mean that such businesses can afford to be complacent, since this action only represents the first of many possible steps on their digital

journey. Companies that have developed an online presence may still struggle or fail. Many previously successful traditional B&M retailers are experiencing difficulties, with well-known brands having consequently been forced into administration (e.g., Coast, Topshop, Patisserie Valerie).

Since technology and innovation are developing rapidly, there has not been a clear path for companies embarking on their digital journey to follow (Kretschmer and Khashabi, 2020). Instead, they need to explore the opportunities as they emerge. Although certain international companies, such as Nike, Lego, and Burberry, have led the way in digital transformation (Hansen and Sia, 2015; Westerman and Bonnet, 2015; Sebastian *et al.*, 2017; Hinings, Gegenhuber and Greenwood, 2018; Correani *et al.*, 2020; Kretschmer and Khashabi, 2020), it is difficult for more localised companies to simply follow their journey due to the different conditions, such as limited resources, narrower vision, and less flexible cultures. Given that many longstanding, well-known retail brands (e.g., Coast, Topshop) are being forced into administration, there is clearly a need for business capabilities to weather the digital vortex. Therefore, this thesis focuses on the industry of retailing, which is one of the contexts that suffer from digital disruption.

1.5 Thesis Structure

This thesis is organised in a paper format (Figure 1-2). Chapter 1 introduces the background, the rationale, and the design of the research. Chapter 2 addresses the first objective, reviewing relevant literature on digital transformation and dynamic capabilities, mainly focusing on the disaggregated sensing, seizing, and transforming capabilities. Chapter 3 (empirical paper) addresses the second objective, examining the possible reasons hindering digital transformation from a dynamic capability perspective and applying the framework of sensing, seizing, and transforming through a longitudinal case study. This paper contributes to the theory by identifying how mismatches arise during the coevolution of dynamic capabilities and their consequences in the context of digital transformation. Chapter 4 discusses the study's overall theoretical contributions, managerial implications, methodological implications, limitations, and future research.

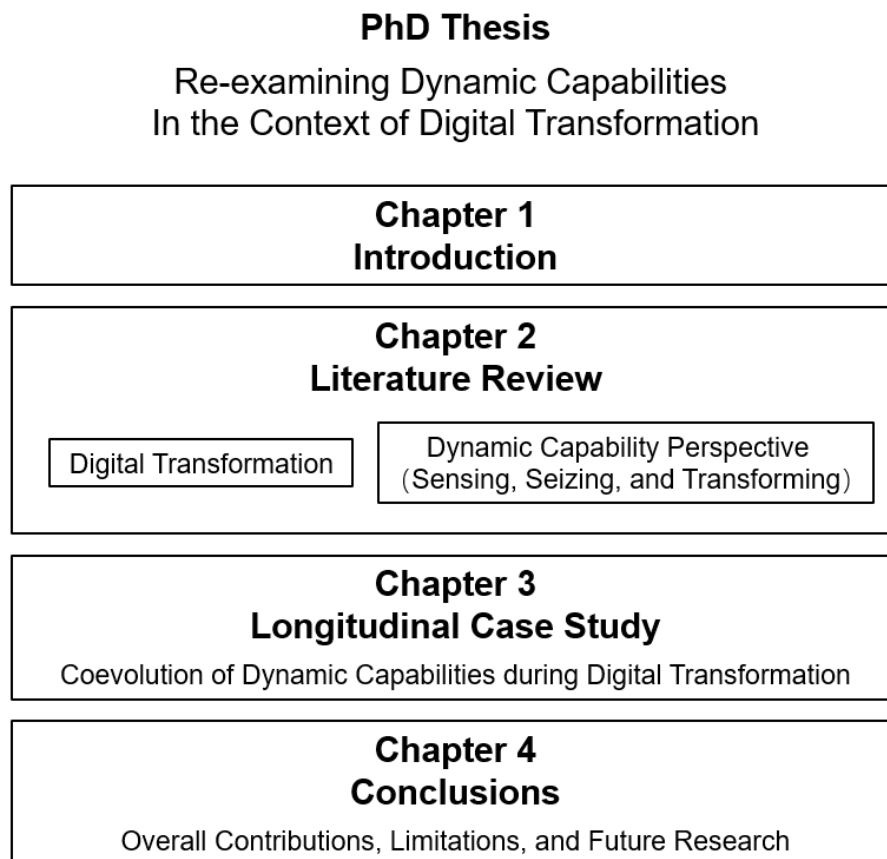


Figure 1-2 Thesis structure

2 LITERATURE REVIEW

2.1 Introduction

This chapter starts with the dynamic capability perspective, which provides a theoretical lens through which to understand the phenomenon of digital transformation. The origin, concept, and hierarchies of dynamic capabilities, and especially, its disaggregation to clusters of dynamic capabilities, are reviewed. Next, the chapter explores the definition and process of digital transformation. Finally, digital transformation is discussed as a special context for dynamic capability research. In short, this chapter begins with dynamic capabilities, mainly focusing on disaggregated sensing, seizing, and transforming capabilities, as the theoretical foundation of this phenomenon, and ends with understanding digital transformation as the context of this research.

2.2 Theoretical Perspective: Dynamic Capabilities

The core building block of dynamic capabilities is a routine. Routine is a “behaviour that is learned, highly patterned, repetitious, or quasi-repetitious, founded in part in tacit knowledge” (Winter, 2003, p. 991). Patterns of activities or a collection of routines are the essential substance of capabilities (Parmigiani and Howard-Grenville, 2011; Felin *et al.*, 2012). A capability enables the repeated and reliable performance of activities (Helfat and Winter, 2011). Operational capabilities keep firms stable by “producing and selling the same product, on the same scale and to the same customer population over time” (Winter, 2003, p. 992). Dynamic capabilities “change the product, the production process, the scale, or the customers (markets) served” (Winter, 2003, p. 992). The dynamic capability concept was introduced to address rapidly changing environments (Teece, Pisano and Shuen, 1997). In stable environments, where external changes are at a low rate, predictable, and incremental (Duncan, 1972), operational capabilities play a major role (Wilden and Gudergan, 2015). In contrast, in turbulent environments, which are fast-changing and unpredictable, operational capabilities become insufficient, and dynamic capabilities start to play

a crucial role in response to the high rate of external changes to maintain competitiveness (Wilden and Gudergan, 2015).

While investing in dynamic capabilities to accomplish changes typically requires cost, firms can actually address changes without relying on dynamic capabilities. Firms often have to “cope with problems they are not well prepared for” and “change without having a dynamic capability”, and in this case, problems or changes can be dealt with through “ad hoc problem solving” (Winter, 2003, p. 992), which refers to addressing isolated problems without patterned behaviours (Helfat and Winter, 2011). On one hand, there will always be “unexpected snags that are beyond the scope of the dynamic capability, and require a complementary dose of ad hoc problem solving” (Winter, 2003, p. 993). On the other hand, patterns can be learned from ad hoc problem solving and so can be applied to similar problems in recurrent episodes, and in this case, dynamic capabilities can be developed (Helfat and Winter, 2011).

2.2.1 Origin of Dynamic Capabilities

The dynamic capability perspective is an extension of the RBV (Cavusgil, Seggie and Talay, 2007; Ambrosini and Bowman, 2009; Easterby-Smith, Lyles and Peteraf, 2009; Barreto, 2010). Before the RBV (Barney, 1991), there were two dominant strategy models: the competitive forces approach of Michael Porter (Porter, 1980) and the strategic conflict approach that stemmed from Game Theory (Shapiro, 1989). After Porter’s Five Forces model (Porter, 1980) was introduced for competitive strategy, Shapiro (1989) introduced game theory as a tool for businesses to develop competitiveness. Both are rooted in the school of Chamberlin’s model of monopolistic competition (Chamberlin, 1933). They emphasise market power: that is, strategies developed in response to external factors rather than internal factors. Porter’s competitive forces approach focuses on industrial analysis, while game theory focuses on the analysis of competitors’ behaviours. However, companies can develop unique forms of competitiveness based on their firm-specific resources. From this perspective, the RBV was introduced according to the nature of the Ricardian Model (Ricardo, 1817), and it emphasises the internal firm-specific resources with the VRIN criteria, which

stand for valuable, rare, imperfectly imitable, and non-substitutable (Barney, 1991). While some scholars suggest that a firm's performance is driven by its heterogeneous resources (Barney, 1991), others argue that resources only provide potential value, and a firm's performance is actually generated from capabilities that deploy its resources (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000).

The RBV focuses on identifying scarce, firm-specific resources that generate sustained competitive advantage and superior profit. However, it is less clear how firms stay competitive when external environments change. The business environment changes rapidly in many industries, especially within global high-technology industries (Loucks *et al.*, 2016), rendering current resources less effective at sustainable competitive advantage. In the face of environmental changes, technological discontinuities can enhance or destroy existing capabilities (Tushman and Anderson, 1986). Therefore, core capabilities, which form the competitiveness for firms' early successes and are not easily imitated due to their unique heritage nature, can lead to incumbent inertia (Lieberman and Montgomery, 1988). In other words, updating capabilities according to the changing environment is crucial. Failure to do so can result in a capability gap and core rigidities, which makes the firm increasingly uncompetitive (Leonard-Barton, 1992). The changes in the external environment lead to changes within the business, and embedded knowledge that used to be useful can be undermined by internal changes (Henderson and Clark, 1990). These changes generate innovations, which lead to a certain degree of creative destruction, which Schumpeter (1942, p. 82) defined as the "process of industrial mutation that incessantly revolutionizes the economic structure from within, incessantly destroying the old one, incessantly creating a new one".

A static economic environment is characterised by repetitive activities and no destruction, and therefore, an economic system can achieve its maximum utilization and thus achieve an optimum level of output (Schumpeter, 1912). The concept of circular flow was introduced to describe a condition in which economic activities continuously produce themselves at a constant rate (Schumpeter,

1912). This goes in line with the concept of simple reproduction proposed by Marx (1867). While Marxian economic theory believes that economic development is a process of the accumulation and annihilation of wealth under capitalism (Marx, 1867), Schumpeter's theory of economic development (Schumpeter, 1912) associates the demise of a system to creative destruction unleashed by capitalism. In other words, rather than a static setting, Schumpeter (1912) highlights that economic development is a dynamic process, characterised by discontinuous and revolutionary change. In the dynamic setting, circular flow is disrupted and disturbance of equilibrium displaces the pre-existing equilibrium, and therefore, changes take place (Schumpeter, 1912). Although successful innovations can be imitated sooner or later, innovators can still benefit from "above normal" profit, or "rents", before that happens. Similarly, the RBV has been criticised as a static model for explaining rents. If one sees above-average performance, one must find underlying VRIN-like resources (Nason and Wiklund, 2018). However, the question remains: how do these resources evolve over time to continue to generate rent for the firm (Ambrosini, Bowman and Collier, 2009)? The perspective of dynamic capabilities was introduced (Teece, Pisano and Shuen, 1997) to explain the development of resources over time as a function of higher-order capabilities that reconfigure resources in response to changes in the environment and/or goal-directed managerial input (Helfat *et al.*, 2007). Figure 2-1 illustrates this historical view regarding how strategy approaches evolved and where dynamic capabilities came from.

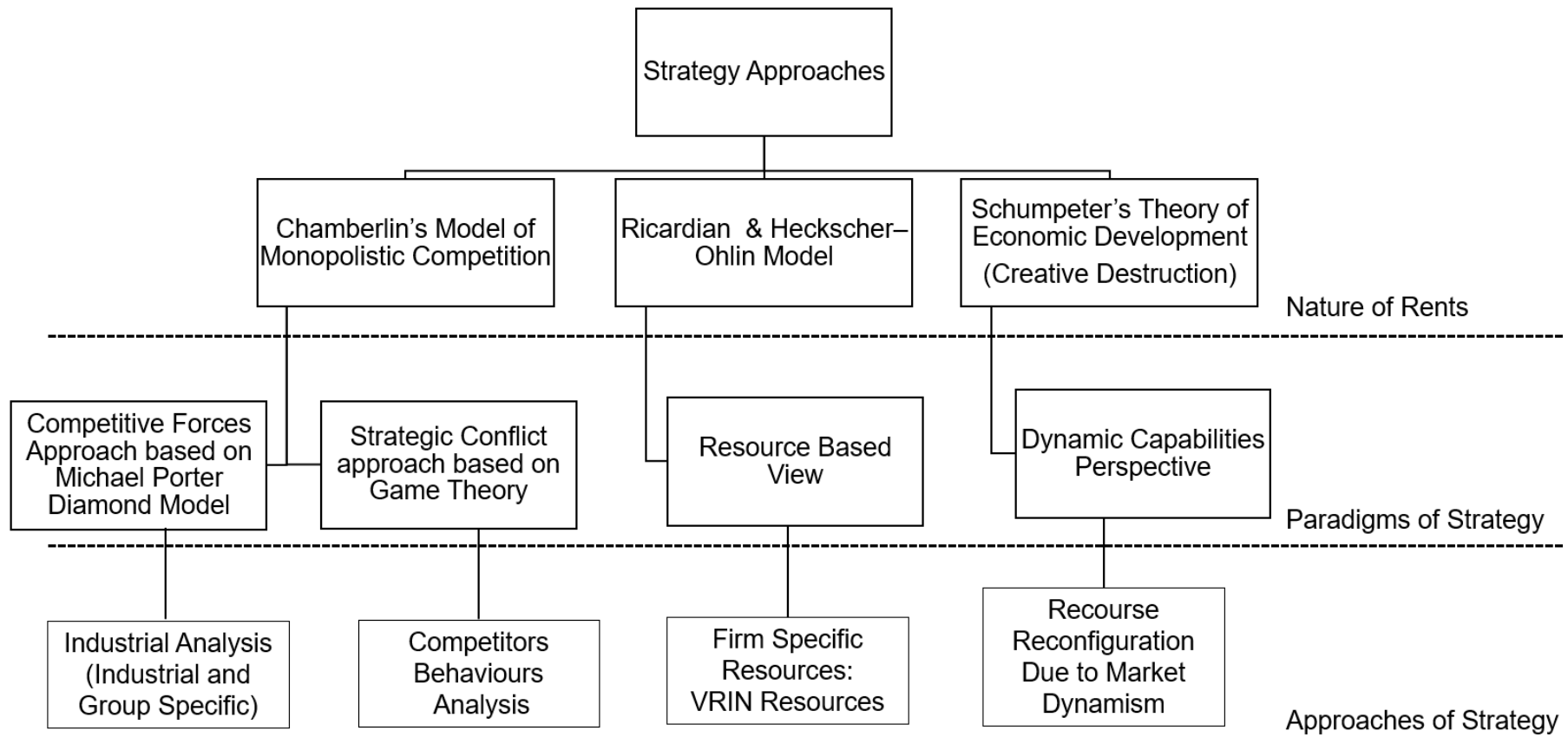


Figure 2-1 Strategy approaches with their theoretical roots and nature of rents

(Ricardo, 1817; Schumpeter, 1912, 1942; Chamberlin, 1933; Porter, 1980; Shapiro, 1989; Barney, 1991; Teece, Pisano and Shuen, 1997)

2.2.2 Concept of Dynamic Capabilities

Teece, Pisano and Shuen (1997) stated that companies possessing dynamic capabilities show competitive advantages that “demonstrate timely responsiveness and rapid and flexible product innovation, coupled with the management capability to effectively coordinate and redeploy internal and external competencies” (Teece, Pisano and Shuen, 1997, p. 515). To understand the concept, Teece (1997) discussed three dimensions of dynamic capabilities: positions, processes, and paths. Through dynamic capabilities, the functions of search and selection as well as deployment or implementation can be realised (Helfat *et al.*, 2007). The underlying processes of dynamic capabilities were unpacked as integration, reconfiguration, renewal and recreation (Wang and Ahmed, 2007). Wang and Ahmed (2007) also identified three main component factors of dynamic capabilities, namely adaptive capability, absorptive capability and innovative capability.

While Teece, Pisano and Shuen’s conceptualisation in 1997 (Teece, Pisano and Shuen, 1997) is the seminal work in the field of dynamic capabilities, representing the traditional view, Eisenhardt and Martin’s work in 2000 (Eisenhardt and Martin, 2000) is regarded as another seminal paper representing a reconceptualised view (Peteraf, Di Stefano and Verona, 2013). Dynamic capabilities were initially defined by Teece, Pisano and Shuen (1997, p. 516) as “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments”, and were later defined by Eisenhardt and Martin (2000, p. 1107) as a firm’s processes that use resources “to integrate, reconfigure, gain, and release resources” in order to “match and even create market change”. Both definitions emphasise the RBV root of dynamic capabilities.

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Peteraf, Di Stefano and Verona (2013) point out the contradictions between the above two conceptualisations (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000). Firstly, while the traditional conceptualisation views that the dynamic capability approach is applicable in a Schumpeterian world where there are rapid technological changes, the reconceptualised view argues that the pattern of effective dynamic capabilities varies depending on market dynamism (i.e., moderately dynamic to high-velocity markets) and that the traditional conceptualisation of dynamic capabilities reaches boundary conditions in high-velocity markets. Secondly, the traditional conceptualisation believes that dynamic capabilities can be a sustainable advantage if they are not ready to be cloned by competitors, but the reconceptualised view challenges this by arguing that dynamic capabilities are themselves unstable and, as “best practices”, they are substitutable. Thirdly, dynamic capabilities can lead to competitive advantage within the traditional view, but from the reconceptualised view dynamic capabilities are more homogeneous than usually assumed. Peteraf, Di Stefano and Verona (2013) applied a contingency approach, trying to unify these two paradoxically contradictory conceptualisations rooted in the RBV.

The dynamic capability perspective also has its origin in evolutionary theory (Zollo and Winter, 2002). Following the Schumpeterian path (Schumpeter, 1912, 1942), Nelson and Winter (1982) introduced the evolutionary theory in economic change. Consequently, rooted in Schumpeter's theory of economic development and Nelson and Winter's evolutionary economics perspective, dynamic capabilities were introduced (Teece, Pisano and Shuen, 1997) to address the lack of dynamics in the RBV. Whereas the RBV emphasises the firm-specific resources with the VRIN criteria (Barney, 1991), evolutionary theory conceives the survival of a firm as an evolutionary process in response to environmental change (Nelson and Winter, 1982). Therefore, while the RBV lacks dynamism, evolutionary theory provides the

fundamental logic for the dynamic nature of dynamic capabilities. From an evolutionary theory perspective, dynamic capabilities enable continuous learning (Barreto, 2010; Fainshmidt *et al.*, 2016), which is critical in technologically turbulent contexts (Fainshmidt *et al.*, 2016), such as the current rapidly developing digital business environment. Accordingly, Zollo and Winter defined dynamic capabilities as “a learned and stable pattern of collective activity through which the organisation systematically generates and modifies its operating routines in pursuit of improved effectiveness” (Zollo and Winter, 2002, p. 340).

Based on the evolutionary theory, Teece, Pisano and Shuen (1997) introduced evolutionary paths as one essence of dynamic capabilities and claimed that history matters with the notion of path dependencies, which has drawn a lot of attention from scholars in research into dynamic capabilities (Eisenhardt and Martin, 2000; Vergne and Durand, 2011; Reynolds and Yetton, 2015). While operational capabilities can be outsourced, since they can be separable, dynamic capabilities must be developed internally rather than being bought due to their idiosyncratic, distinctive, and cospecialized nature (Teece, Pisano and Shuen, 1997; Teece, 2007, 2018b). The evolution of dynamic capabilities is embedded in organisational processes that are shaped by a firm’s current position and the path being travelled (Teece, Pisano and Shuen, 1997; Barreto, 2010). This implies not only one path but also multiple paths coexisting and interfering with each other (Vergne and Durand, 2011). Therefore, it can be inferred that the development of dynamic capabilities can have different evolutionary paths, which are potentially an important aspect of their dynamic nature.

Figure 2-2 illustrates a historical view regarding how academia gets to dynamic capabilities and the two theoretical roots of dynamic capabilities. Therefore, two theoretical underpinnings for dynamic capabilities, namely the

RBV perspective and evolutionary theory, are widely accepted (Barreto, 2010; Fainshmidt *et al.*, 2016).

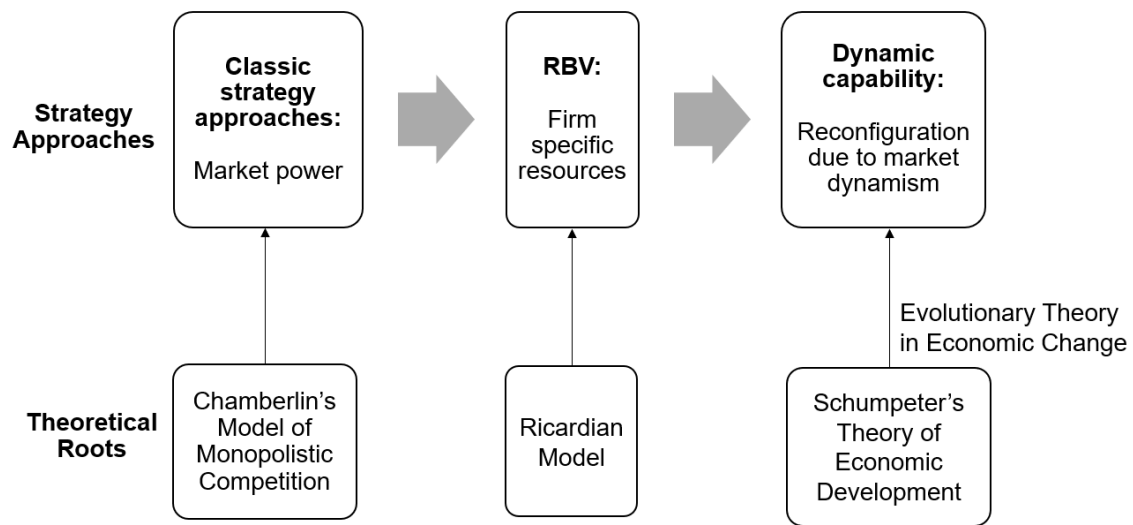


Figure 2-2 Evolution of strategy approaches and theoretical roots of dynamic capabilities

Table 2-1 summarises the major perspectives on the origins and influence of dynamic capabilities. Whilst there are differing definitions of the concept, this thesis follows the definition of dynamic capabilities put forward by Helfat *et al.* (2007) – “the capacity of an organisation to purposefully create, extend, or modify its resource base” (Helfat *et al.*, 2007, p. 1) – due to its clarity and popularity (Kale and Singh, 2007; Ambrosini, Bowman and Collier, 2009; Easterby-Smith, Lyles and Peteraf, 2009; Helfat and Peteraf, 2009; Barreto, 2010). According to Helfat *et al.* (2007), a ‘resource base’ includes anything that can be drawn upon in order to accomplish its aims, and they can be tangible or intangible, human assets, or capabilities that firms own, control or have access to on a preferential basis. Helfat *et al.* (2007) argue that dynamic capabilities comprise part of the resource base, and therefore, dynamic capabilities can modify or extend dynamic capabilities. It can be the case that one dynamic capability alters another one, and there is also a possibility that one dynamic capability can modify or extend itself (Helfat and Peteraf, 2003).

‘Capacity’ means the ability to perform a task to at least a minimally acceptable level (Helfat *et al.*, 2007). Helfat *et al.* (2007) argue that change in the resource base implies only doing something differently, but not necessarily better, and that dynamic capabilities can be repeatedly and reliably executed to at least some extent. This implies patterned and somewhat practiced activity, and so distinguishes it from ad hoc or one-time change, and also from innate talent. ‘Purposefully’ distinguishes organisational routines from accident or luck, and shows a degree of intent, even if it is not fully explicit (Helfat *et al.*, 2007). Within this definition, ‘create, extend, or modify’ is the part that distinguishes dynamic capabilities from operational capabilities (Helfat *et al.*, 2007).

Studies	Definition
Teece, Pisano and Shuen (1997, p. 516)	The firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.
Eisenhardt and Martin (2000, p. 1107)	The firm’s processes that use resources—specifically the processes to integrate, reconfigure, gain, and release resources—to match and even create market change; dynamic capabilities thus are the organisational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die.
Zollo and Winter (2002, p. 340)	A dynamic capability is a learned and stable pattern of collective activity through which the organisation systematically generates and modifies its operating routines in pursuit of improved effectiveness.
Helfat <i>et al.</i> (2007, p. 1)	The capacity of an organisation to purposefully create, extend, or modify its resource base.

Table 2-1 Main definitions of dynamic capabilities

2.2.3 Hierarchies of Dynamic Capabilities

According to the RBV, the resource base that dynamic capabilities can reconfigure contains capabilities: thus, dynamic capabilities can theoretically reconfigure themselves (Helfat and Peteraf, 2009). Therefore, dynamic capabilities are referred to as a type of higher order capabilities and discussions are consequently made about a hierarchy of capabilities. Collis (1994) proposed four categories of organisational capabilities: the first category is the resource base for functional capability; the second category is the capability to modify the resource base; the third category is the capability to create and extend the resource base; the fourth category is the meta-capability for learning to learn. From these four categories, the second and third are closest to the concept of dynamic capabilities (Teece, Pisano and Shuen, 1997).

Winter (2003) proposed a two-level hierarchy of capabilities: operational or ordinary capabilities (zero-level) and dynamic capabilities (first-level). Operational capabilities enable “a firm to perform an activity on an on-going basis using more or less the same techniques on the same scale to support existing products and services for the same customer population” (Helfat and Winter, 2011, p. 1244), similar to Collis’s first category of capabilities to perform the basic functional activities (Collis, 1994). In comparison, dynamic capabilities are those capabilities that “change the product, the production process, the scale, or the customers (markets) served” (Winter, 2003, p. 992) by reconfiguring the resource base (Teece, Pisano and Shuen, 1997). As such, dynamic capabilities are seen as higher-order capabilities regarding the nature of reconfiguring operational capabilities. Table 2-2 summarises the different hierarchies of capabilities in the literature.

The two-level hierarchy discussed by Winter (2003) is commonly used in the literature, and this thesis follows this hierarchy, since it clearly differentiates dynamic capabilities from operational capabilities. Operational

capabilities, also termed ordinary capabilities or zero-level capabilities, are defined as those that enable a firm to make a living in a short time (Winter, 2003). Dynamic capabilities, in comparison, are higher-order capabilities, which enable a firm to “alter how it currently makes its living” (Helfat and Winter, 2011, p. 1244): in other words, capabilities that “change the product, the production process, the scale, or the customers (markets) served” (Winter, 2003, p. 992). Therefore, Winter refers to dynamic capabilities as “those that operate to extend, modify or create ordinary capabilities” (Winter, 2003, p. 991). According to Winter (2003), the hierarchy is only locally defined. For instance, developing new products is an ordinary capability to an independent research and development (R&D) lab; however, in comparison, to a company producing and selling products can be ordinary capabilities while developing new products through their own R&D can be a dynamic capability.

Zollo and Winter (2002) investigated the mechanism for firms to develop their dynamic capabilities, and consequently proposed three learning mechanisms (i.e., experience accumulation, knowledge articulation, and knowledge codification). They suggested that, as stable patterns of organisational behaviour, routines can be classified into two types: while the first type execute known procedures for current profit, the second type seek desirable changes of existing procedures for future benefit. Following Nelson and Winter’s (1982) evolutionary economics perspective (Nelson and Winter, 1982), the latter is about search routines, involving the learning mechanism named as experience accumulation, which is viewed as part of dynamic capabilities (Zollo and Winter, 2002). Zollo and Winter (2002) emphasised the importance of collective learning by expressing one’s own and challenging each other’s opinions constructively, since organisational capabilities evolve when individuals are explicitly aware of the implications of their actions. This led them to propose that the learning mechanism relates to knowledge articulation by which implicit knowledge in the organisation is articulated (surfaced) through

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collective discussions, resulting in adaptive adjustments to existing routines and the development of dynamic capabilities. After achieving knowledge articulation, knowledge codification is a step beyond, which is supportive of the whole evolution process. Therefore, Zollo and Winter (2002) argue that dynamic capabilities are developed with the coevolution of these three mechanisms.

Hierarchies of capabilities	Ordinary Capabilities	Dynamic Capabilities			Meta Capabilities
Four levels of organisational capabilities (Collis, 1994)	1st – Resource base/ability to perform functional activity	2nd – Dynamic capabilities that simply modify the resource base	3rd – Dynamic capabilities that create and extend the resource base		4th – Higher order/meta capabilities (learn-to-learn capabilities)
Two levels of abilities (Danneels, 2002)	1st – Ability to achieve an individual task	2nd – Ability to renew first order capabilities			
Two levels of capabilities (Winter, 2003)	0 – Operational capabilities / Ordinary capabilities	1st – Dynamic capabilities			
Three levels of learning mechanism for DC (Zollo and Winter, 2002)		1st – Experience accumulation	2nd – Knowledge articulation	3rd – Knowledge codification	
Three levels of DC (Ambrosini, Bowman and Collier, 2009)		1st – Incremental dynamic capabilities	2nd – Renewing dynamic capabilities	3rd – Regenerative dynamic capabilities	

Table 2-2 Different hierarchies of capabilities from the literature

2.2.4 Disaggregation of Dynamic Capabilities into Sensing, Seizing, and Transforming

Whilst dynamic capabilities became an important component of strategy research (Teece, Pisano and Shuen, 1997), scholars and managers found the concept hard to research, identify and manage (Easterby-Smith, Lyles and Peteraf, 2009). A decade after their seminal paper, Teece (2007) addressed the challenges by disaggregating the high level concept into three clusters: sensing, seizing, and transforming capabilities. This taxonomy approach for analysing data progresses dynamic capabilities to a more operational level. It has been widely applied in empirical research as an approach to unpack dynamic capabilities (e.g., Katkalo, Pitelis and Teece, 2010; Hodgkinson and Healey, 2011; Helfat and Peteraf, 2015; Matysiak, Rugman and Bausch, 2018) in different contexts (e.g., Warner and Wäger, 2019; Alinaghian, Kim and Srari, 2020).

Apart from the dominant classification of sensing, seizing and transforming, dynamic capabilities are also classified through learning capabilities (Zollo and Winter, 2002), or sensing, integrating and coordinating capabilities (Pavlou and El Sawy, 2011), or sensing, learning and reconfiguring capabilities (Wilhelm, Schlömer and Maurer, 2015), or sensing, shaping and seizing capabilities (Felin and Powell, 2016). Indeed, Leemann and Kanbach (2022) expanded Teece's three-item taxonomy into a three-level taxonomy of dynamic capabilities with 19 level-two and 240 level-three capabilities. However, this is likely over-specified and makes research and practice unduly complicated.

2.2.4.1 The concepts of Sensing, Seizing and Transforming

Sensing was first introduced as "to sense and shape opportunities and threats" (Teece, 2007, p. 1319) and later further described as relating to identifying, shaping, developing, and assessing opportunities (Teece, 2014; Teece, Peteraf and Leih, 2016). Extracting from the three papers (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016), sensing involves identifying, filtering, shaping, assessing, developing, and calibrating opportunities; it involves activities regarding scanning, creation, learning, and interpretation; the microfoundations are processes to direct internal R&D and select new technologies, to tap

developments in exogenous science and technology, to tap supplier and complementary innovation, and to identify target market segments, changing customer needs, and customer innovation. In summary, sensing includes not only identifying opportunities but also assessing and developing opportunities, and in particular, it involves scanning, creation, learning, and interpretive activities to not only tap opportunities but also filter, shape, and calibrate them.

Seizing was first introduced as “to seize opportunities” (Teece, 2007, p. 1319) and later further described as mobilizing resources to address opportunities (Teece, 2014; Teece, Peteraf and Leih, 2016). Extracting from the three papers (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016), seizing is to mobilize resources to address opportunities, and to capture value from doing so; it involves activities regarding investment, strategic choices, and commercialisation; the microfoundations are delineating the customer solution and the business model, selecting enterprise boundaries to manage complements and control platforms, selecting decision-making protocols, and building loyalty and commitment. In short, seizing is to capture value by addressing opportunities through changing the resource base, and, for instance, strategic decision-making amongst investment choices and corresponding business model selection.

Transforming was first introduced to maintain competitiveness through enhancing, combining, protecting, and reconfiguring assets, and was later described as continued renewal (Teece, 2014; Teece, Peteraf and Leih, 2016). Extracting from the three papers (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016), transforming is the continuous alignment and realignment of assets through enhancing, combining, protecting and when necessary, reconfiguring, tangible and intangible assets; it involves activities regarding shaping culture to accept high levels of internal change, routines and structures being adapted gradually or (semi-continuous) steps, top management leadership skills and managerial functions, and business model redesign and asset-realignment; the microfoundations involve decentralization and near decomposability, cospecialisation, governance, and knowledge management. In short,

transforming aims to manage threats and maintain competitiveness through continued reconfiguration of the resource base, and more specifically, it is a continued renewal process including culture, routines and structure, top management leadership and managerial function, and business model redesign and asset realignment for sustained profitable growth.

Intensional and extensional definitions were first introduced by Arnauld and Nicole (1662, 1861), and remain as two basic ways of understanding a concept. While intension (or connotation) refers to the internal content (a collection of characteristics or properties) of a concept that constitutes its formal definition, extension (or denotation) denominates a range of applicability by naming the particular objects that it denotes (Doležel, 1979). The development of a concept can progress from an intensional definition to a set of objects, or start with a range of objects and then extract the set of properties from the range. Intension and extension are correlative aspects of a concept, and in particular, the intensional meaning of a concept captures the essential characteristics or attributes and so determines its extension (Arnauld and Nicole, 1662; Angeles, 1992). In the case of the concepts regarding sensing, seizing and transforming, synthesising from Teece's papers (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016), the elements of intensional and extensional definitions of sensing, seizing, and transforming are presented in Table 2-3.

DC	Elements of intensional and extensional definitions (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016)
Sensing	Intensional (essential attributes): To sense opportunities and threats Extensional (a set of objects): Scanning, searching, exploring, monitoring, sensing, probing and reprobating, tapping, identifying, assessing, analysing, learning, creation, investment in research (R&D), filtering, shaping, calibrating, interpreting and understanding, developing, co-developing
Seizing	Intensional (essential attributes): To capture value by addressing opportunities Extensional (a set of objects): Mobilising resources, investment decisions, strategic choices, selecting or creating a customer solution or business model, selecting, designing, calibrating, assessing, building, recognizing, managing
Transforming	Intensional (essential attributes): To maintain competitiveness through continued renewal Extensional (a set of objects): Continuous alignment and realignment of assets, enhancing, combining, protecting, reconfiguring assets, shaping culture, redesigning routines and structures, top management leadership skills renewal, business model redesign, decentralizing, cospecializing, governing, learning, knowing-how

Table 2-3 How are sensing, seizing, and transforming conceptualised?

From the lists of referents of sensing, seizing, and transforming in Table 2-3, there are overlaps between them from an operationalising perspective. Sensing, seizing, and transforming capabilities can coexist and are not necessarily, as presented in Figure 2-3, sharply delimited.

First, while sensing involves scanning, searching, probing and identifying opportunities, seizing involves creating or developing a solution to address the opportunities identified. However, there could be a grey area between sensing and seizing operationally. Since sensing includes filtering, shaping, calibrating, analysing, interpreting, understanding, and assessing, and seizing also includes selecting, designing, calibrating and assessing, there could be a grey area between sensing and seizing whereas strategic choices could be formed after opportunities have been identified and before they are actually addressed.

Secondly, since seizing involves mobilising resources and creating a customer solution or business model; and transforming involves enhancing, combining, protecting, reconfiguring, realigning assets, and redesigning routines, structures, or business models, clearly, configuring resources and designing routines, structures or business models could be both part of seizing and transforming. This, in turn, creates a grey area between seizing and transforming capabilities.

Thirdly, sensing and transforming could both involve learning. Shaping culture for learning and learning for know-how is a feature for businesses to sense and also to transform digitally during the current digital era. Therefore, sensing and transforming could both manifest in the same activities as well.

For the purpose of visualisation, Table 2-3 is represented and demonstrated by Figure 2-3, with the overlaps in grey boxes, which can indicate the coexistence of sensing, seizing, and transforming capabilities.

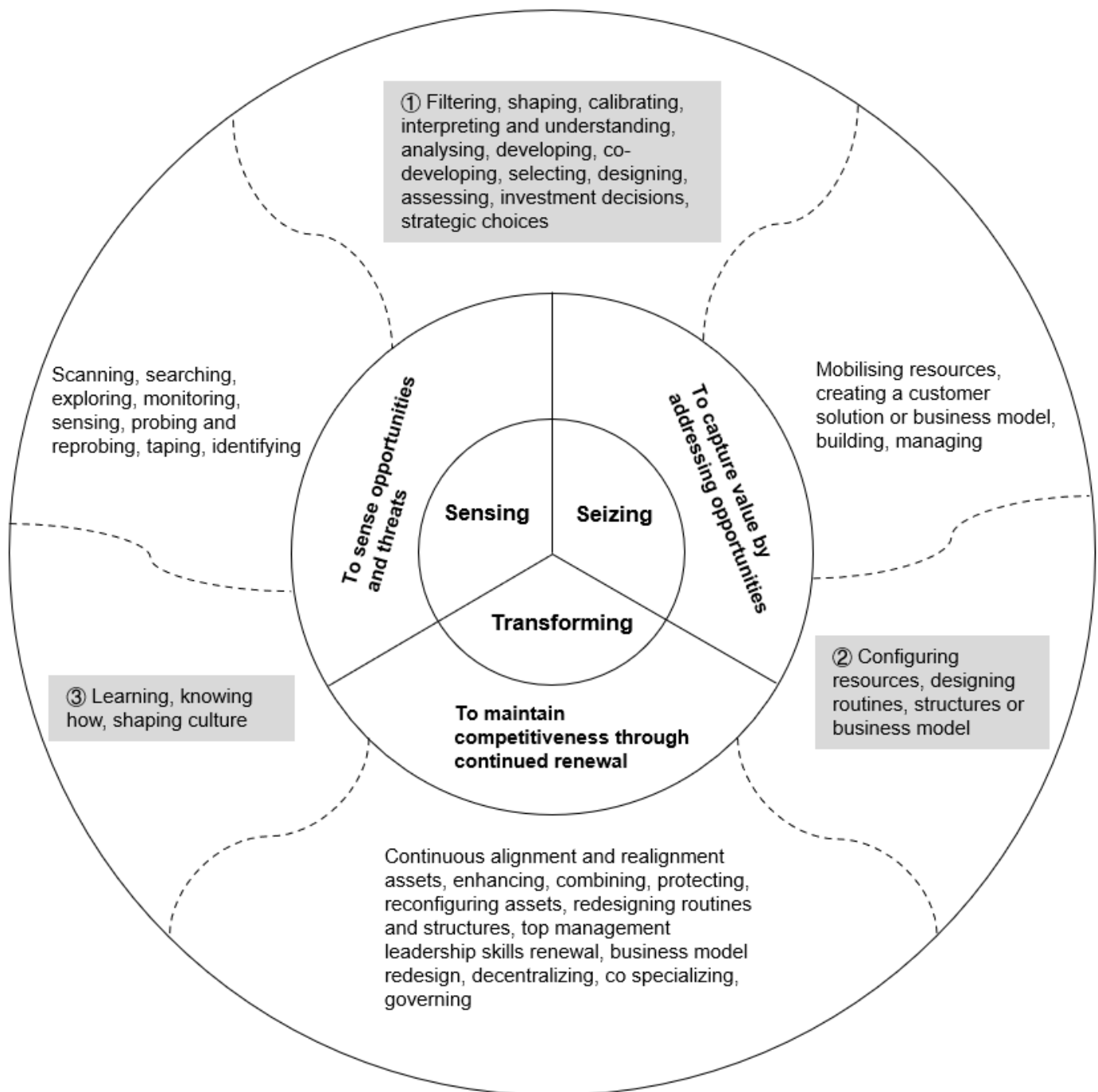


Figure 2-3 Coexistence of sensing, seizing, and transforming

2.2.4.2 How are they Interpreted Empirically?

This section attempts to review the coding structure of empirical studies in order to see how sensing, seizing, and transforming have been interpreted empirically by scholars. I searched through Google Scholar and identified 36 relevant empirical studies published in top journals. After initial screening of the abstracts, I revisited 12 empirical studies applying the framework of sensing, seizing, and transforming (e.g., Martin, 2011; Vanpoucke, Vereecke and Wetzels, 2014; Birkinshaw, Zimmermann and Raisch, 2016; Alinaghian, Kim and Srari, 2020). I then skimmed these studies, and found that the majority of them applied the framework without disclosing their coding structure (Harreld, O'Reilly and Tushman, 2007; Velu, 2017; Wilden, Gudergan and Lings, 2019). Eventually, qualitative studies providing their clear coding structures were selected (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012; Kindström, Kowalkowski and Sandberg, 2013; Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019). Table 2-4 presents how sensing, seizing, and transforming were interpreted in these studies.

Contexts	Sensing capabilities	Seizing capabilities	Transforming capabilities
Digital transformation: (Warner and Wäger, 2019)	<ul style="list-style-type: none"> ▪ Digital scouting <ul style="list-style-type: none"> - Scanning for technological trends; Screening of digital competitors; Sensing customer-centric trends. ▪ Digital scenario planning <ul style="list-style-type: none"> - Analysing scouted signals; Interpreting digital future scenarios; Formulating digital strategies. ▪ Digital mindset crafting <ul style="list-style-type: none"> - Establishing a long-term digital vision; Enabling an entrepreneurial mindset; Promoting a digital mindset. 	<ul style="list-style-type: none"> ▪ Rapid prototyping <ul style="list-style-type: none"> - Creating minimum viable products; Considering a lean start-up methodology; Using a digital innovation lab. ▪ Balancing digital portfolios <ul style="list-style-type: none"> - Balancing internal and external options; Scaling up innovative business models; Setting an appropriate speed of execution. ▪ Strategic agility <ul style="list-style-type: none"> - Joining a digital ecosystem; Interacting with multiple external partners; Exploiting new ecosystem capabilities. 	<ul style="list-style-type: none"> ▪ Navigating innovation ecosystems <ul style="list-style-type: none"> - Joining a digital ecosystem; Interacting with multiple external partners; Exploiting new ecosystem capabilities. ▪ Redesigning internal structures <ul style="list-style-type: none"> - Hiring a chief digital officer; Digitalization of business models; Designing team-based structures. ▪ Improving digital maturity <ul style="list-style-type: none"> - Identifying digital workforce maturity; External recruiting of digital talent; Leveraging digital knowledge inside firm.
Digital strategy (Yeow, Soh and Hansen, 2018)	<ul style="list-style-type: none"> ▪ Scanning: actions to “explore opportunities and markets”, “gather information from internal and external sources”, and “filter relevant information to detect potential opportunities”. ▪ Learning: actions to “learn and evaluate potential opportunities 	<ul style="list-style-type: none"> ▪ Designing: actions “undertaken to plan and design its new structures and processes”. ▪ Selecting: actions of “selecting among different options available in terms of its designs and other potential solutions for capturing the opportunities”. 	<ul style="list-style-type: none"> ▪ Leveraging: actions “putting existing resources, specifically fungible resources, to new uses”. ▪ Creating: actions refer to “the creation of new resources and processes, which are combined to form a new competence”. ▪ Accessing: actions refer to “the

	<p>by monitoring performance or gaining more insights so to assess and identify specific areas for further actions”</p> <ul style="list-style-type: none"> ▪ Calibrating: actions to “engage in further sensemaking after organizations have probed specific opportunities and attempt to refine their prior actions and figure out implications for future actions” 	<ul style="list-style-type: none"> ▪ Committing: actions refer to “decisions taken by the organization on how to implement the designs as well as decisions concerning specific options of partners, services, processes, or business models”. 	<p>use of external resources”.</p> <ul style="list-style-type: none"> ▪ Releasing: action of “dropping existing resources, such as reducing the workforce or removing resource combinations that may not be optimal for a new digital strategy”.
<p>Service innovation (Kindström, Kowalkowski and Sandberg, 2013)</p>	<ul style="list-style-type: none"> ▪ Customer-linked service sensing: Building up deep customer knowledge, including institutionalizing feedback loops and creating organisational roles, systems, and processes that continuously capture and relay customer demands. ▪ Service system sensing: Building up an understanding of the entire service system, including links to partners and suppliers, and creating network skills. ▪ Internal service sensing: Building up internal sensing: e.g., opportunities related to the 	<ul style="list-style-type: none"> ▪ Service interactions: Interacting and co-developing with customers and partners to understand, visualize, and deliver value propositions. Involves processes, roles, and skills to interact and change together with customers. ▪ Managing the service delivery process: Having the ability to restructure internal and external resources swiftly, for the delivery of new or improved services, including roles dedicated to services at both operational and strategic levels. ▪ Structuring the service development process: 	<ul style="list-style-type: none"> ▪ Orchestrating the service system: Managing and transforming the service system, especially managing external actors central to performance of the service. An ability to extend the resource base into new markets and services, and to incorporate complementary resources and co-specialization. Reconfiguring roles, resources, locus of control, and power in the service system. ▪ Balancing product and service-innovation related assets: Maintaining a balanced relationship between the service

	<p>integration of products and services and the detection of decentralized initiatives. Having a structured service development process to address this factor.</p> <p>▪ Technology exploration: Scanning and exploring sources outside the service system, primarily related to more radical technological changes.</p>	<p>Structuring a service development process and being flexible as the process develops.</p> <p>▪ Adopting new revenue mechanisms: Rolling out new revenue mechanisms based on service value, such as availability and customer productivity. The ability to visualize the value of new, often intangible services and solutions for a wide array of actors in the service-delivery system.</p>	<p>organisation and the product organisation, necessitating the creation of roles designed for service on all levels of the organisational structure.</p> <p>▪ Creating service-oriented mental model: Often referred to as a service logic; implies a learning dimension.</p>
Innovation (Jantunen, Ellonen and Johansson, 2012)	<p>▪ <i>Internal R&D</i></p> <p>▪ <i>Identifying changing customer needs/customer innovation</i></p> <p>▪ <i>Processes to tap technological developments</i></p> <p>▪ <i>Processes to tap supplier and complementor innovation</i></p>	<p>▪ <i>Delineating the business model</i></p> <p>▪ <i>Decision-making protocols</i></p> <p>▪ <i>Managing complements and platforms</i></p>	<p>Reconfiguring capabilities</p> <p>▪ <i>Knowledge management</i></p> <p>▪ <i>Leadership practices</i></p> <p>▪ <i>Asset co-specialization</i></p> <p>▪ <i>Resource reconfiguration</i></p>
Management innovation (Gebauer, 2011)	<p>Sensing capabilities</p> <p>▪ <i>Recognizing and dealing with service opportunities and threats</i></p> <p>Sensing routines</p> <p>▪ <i>Frequently executed</i></p> <p>▪ <i>Minimal causal ambiguity</i></p>	<p>Seizing capabilities</p> <p>▪ <i>Exploiting the sensed opportunities and fending off threats</i></p> <p>Seizing routines</p> <p>▪ <i>Executed only occasionally</i></p> <p>▪ <i>Minimal causal ambiguity between</i></p>	<p>Reconfiguring capabilities</p> <p>▪ <i>Modifying operational capabilities</i></p> <p>Reconfiguring routines</p> <p>▪ <i>Executed continuously</i></p> <p>▪ <i>High causal ambiguity between</i></p>

	<i>between action and outcome</i> ▪ <i>Moderate heterogeneity of tasks for executing the routines</i>	<i>action and outcomes</i> <i>High heterogeneity of tasks for executing routines</i>	<i>actions and outcomes</i> <i>Low heterogeneity of tasks for executing routines</i>
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Table 2-4 Interpretation of sensing, seizing, and transforming in empirical studies

Firstly, the interpretations of sensing and seizing are examined (Table 2-4). Some studies categorise strategic choices (namely, creating scenarios and strategic avenues, articulating strategic vision, and formulating and executing strategy) and decision-making as seizing capabilities (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012). However, other studies use the taxonomy differently. Yeow, Soh and Hansen (2018) interpret formulating strategy as calibrating the opportunity, which is classified as sensing. Warner and Wäger (2019) classify scenario planning as sensing, which includes analysing scouted signals, interpreting future scenarios, and formulating strategies. One can see that, although analysing and interpreting are conceptualised as sensing and strategic choices as seizing according to Table 2-4 (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016), research has often had to deal with grey areas such as scenario planning, which can involve analysing, interpreting, and formulating strategies. While analysing and interpreting can be classified as sensing, formulating strategies can be classified as seizing. In other words, scenario planning potentially operates between sensing and seizing empirically, and can be interpreted as both sensing (analysing and interpreting) and seizing (formulating strategies). Overall, this indicates that the same activity can manifest both statuses and so provides empirical support for the coexistence between sensing and seizing.

Attempts have been made to draw a clearer line between sensing and seizing by specifying sensing as selecting among opportunities and seizing as selecting among different options available to capture the opportunities (Yeow, Soh and Hansen, 2018). This indicates a linear process from sensing an external opportunity first to seizing it through an internal solution. However, empirical studies show more complexity in reality than the distinct and linear steps. Kindström, Kowalkowski and Sandberg (2013) identified internal sensing as part of sensing capabilities: for instance, opportunities regarding product and service integration. This indicates that opportunities identified by sensing capabilities for the subsequent seizing capabilities require an understanding of the available internal solutions, which could be classified as seizing capabilities (Yeow, Soh

and Hansen, 2018). Kindström, Kowalkowski and Sandberg (2013) also identified interacting and co-developing solutions with customers and partners as seizing capabilities. This shows an interactive process between sensing a change and seizing a change, rather than a linear process from sensing to seizing. While co-developing is conceptualised as sensing according to Table 2-4, it is interpreted as seizing in the empirical study by Kindström, Kowalkowski and Sandberg (2013). Warner and Wäger (2019) also proposed balancing internal and external options as part of seizing capabilities. This again shows that opportunities and options available internally and externally need to be considered together to decide upon which opportunity is prioritised and how to address it. In practice, strategic choices are more likely to be made in feedback loops through interactions between sensing external opportunities and assessing available internal options or solutions.

This argument can also be supported by path dependencies of dynamic capabilities (Teece, Pisano and Shuen, 1997), which are seen as firm-specific and unique (Barreto, 2010), because the current position and the paths available for a company are shaped by the path it has travelled: that is, history matters. Peteraf, Di Stefano and Verona (2013) pointed out that the key difference between the two seminal papers on dynamic capabilities (Teece, Pisano and Shuen, 1997; Eisenhardt and Martin, 2000) is whether the competitive advantage from dynamic capabilities is sustainable. The traditional view argues that since dynamic capabilities are difficult to replicate and imitate and not ready to be cloned by competitors, they can provide a sustainable competitive advantage (Teece, Pisano and Shuen, 1997). In contrast, rather than having idiosyncrasy as the key feature, in their reconceptualised view, Eisenhardt and Martin (2000) argued that dynamic capabilities need to have commonalties (popularly termed as best practices) across firms as the key feature with idiosyncrasy in details to be effective. From this perspective, dynamic capabilities can be valuable and rare, but not inimitable or non-substitutable, so they “can be a source of competitive, but not sustainable advantage” (Eisenhardt and Martin, 2000, p. 1110). To understand the heterogeneity of dynamic capabilities, Jantunen (2012) conducted a comparative study and found that, within a single industry, sensing

capabilities are more homogeneous, while seizing capabilities are more idiosyncratic. Conceptually, based on Teece's work (Teece, Pisano and Shuen, 1997), this can be explained as follows: sensing capabilities tend to relate more to the best practices within an industry, while seizing capabilities are more responsible for strategic choices regarding future paths based on path dependencies. Since path dependencies restrain the opportunities that can be seized by a specific firm, there is likely to be an iterative process from possible opportunities sensed based on firm-specific feasible options to opportunities that could be seized based on the firm-specific situation. This provides a possible theoretical explanation for the coexistence between sensing and seizing capabilities.

Secondly, the interpretations of seizing and transforming are reviewed in Table 2-4. Some studies (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012; Yeow, Soh and Hansen, 2018) categorise all activities involving changes in resources as transforming (or reconfiguring). The essential attribute for transforming is to maintain competitiveness through continued renewal, whilst the essential attribute for seizing is to capture value by addressing opportunities, which can also involve mobilising or configuring resources. In practice, as well as in these studies, it is difficult to evaluate whether an activity involving resource configuration (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012; Yeow, Soh and Hansen, 2018) is to seize one opportunity or is part of a continued renewal process for maintaining competitiveness at the time of its execution. This is the same with designs regarding structures, processes, systems, routines, and business models, since it is hard to determine whether a design is a "once off" to serve a particular opportunity, namely seizing, or part of an ongoing, repetitive pattern of continuous realignment, serving transforming. Yeow, Soh and Hansen (2018) classify the design activities as seizing and the execution of the design as transforming. In comparison, Kindström, Kowalkowski and Sandberg (2013) classify them both as seizing operations. Others classify them as transforming capabilities (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012). Seizing and transforming appear to be so interconnected that scholars cannot consistently categorise activities.

Thirdly, the interpretations of sensing and transforming are examined (Table 2-4). Kindström, Kowalkowski and Sandberg (2013) interpret mentality fostering as transforming, implying a learning element. This may also involve overcoming internal resistance and conflicts as part of transforming (Gebauer, 2011). In comparison, Yeow, Soh and Hansen (2018) interpret the conversations to foster a mentality as learning within the sensing cluster, and Warner and Wäger (2019) interpret mindset crafting as sensing as well. The systems and processes built up for deep knowledge and understanding are classified as sensing by Kindström, Kowalkowski and Sandberg (2013), while they can also be conceptualised as transforming to maintain competitiveness through reconfiguration, according to Table 2-4. Kindström, Kowalkowski and Sandberg (2013) categorise the detection of decentralised initiatives as sensing, while decentralization and near decomposability are microfoundations for transforming (Teece, 2007). It is hard to draw a clear line between sensing and transforming with respect to decentralisation. As with seizing and transforming, scholars cannot consistently categorise activities between sensing and transforming.

Empirical studies (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012; Kindström, Kowalkowski and Sandberg, 2013; Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019) allocate the same activity across multiple sub-capabilities, suggesting significant overlap. In terms of sensing, some scholars (Gebauer, 2011; Jantunen, Ellonen and Johansson, 2012; Kindström, Kowalkowski and Sandberg, 2013) view sensing as scanning, exploring, tapping, recognising, or identifying opportunities. A couple of studies in digital transformation (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019) conceptualise sensing as not only scanning, screening and learning but also evaluating, calibrating (Yeow, Soh and Hansen, 2018), analysing, interpreting and formulating (Warner and Wäger, 2019). Some scholars view seizing as preliminary actions for change, including designing processes and structures, selecting amongst options, and committing to a decision (Yeow, Soh and Hansen, 2018); another study views seizing as exploitation (Gebauer, 2011); others consider seizing as including both decision-making processes and exploitation (Jantunen, Ellonen and Johansson, 2012; Kindström, Kowalkowski and

Sandberg, 2013; Warner and Wäger, 2019). Last but not the least, since transforming is sometimes called reconfiguring, some conceptualise transforming as all changes in the resource base, including leveraging, creating, accessing and releasing (Yeow, Soh and Hansen, 2018); some think that certain types of changes in the resource base, such as modifying operational capabilities (Gebauer, 2011), creating a new mental model (Kindström, Kowalkowski and Sandberg, 2013), and structure redesign (Warner and Wäger, 2019) represent transforming; some view transforming as including resource reconfiguration plus other aspects: for instance, knowledge management and asset co-specialisation (Jantunen, Ellonen and Johansson, 2012).

2.2.4.3 How Are Sensing, Seizing and Transforming Measured?

I have found five studies that develop scales to measure sensing, seizing, and transforming (Wilden *et al.*, 2013; Wilden and Gudergan, 2015; Jantunen *et al.*, 2018; Torres, Sidorova and Jones, 2018; Kump *et al.*, 2019). Table 2-5 presents how the three dynamic capability clusters are measured in these four scales. Sensing is measured as searching, observing (Jantunen *et al.*, 2018), gathering information, identifying (Wilden *et al.*, 2013), and knowing and being up-to-date (Kump *et al.*, 2019). However, the elements regarding filtering, shaping, calibrating, analysing, interpreting, assessing, formulating or developing opportunities identified in conceptual (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016) and qualitative studies (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019) were not measured in these four quantitative studies.

The five studies (Wilden *et al.*, 2013; Wilden and Gudergan, 2015; Jantunen *et al.*, 2018; Torres, Sidorova and Jones, 2018; Kump *et al.*, 2019) are not consistent in identifying items for the concepts of seizing and transforming. Torres, Sidorova and Jones (2018) develop the indicators of seizing in three dimensions regarding shared understanding, planning, and decision making. These are all preliminary actions before implementing change, and thus are consistent with Yeow, Soh and Hansen's (2018) interpretation. However, Jantunen *et al.* (2018) include the implementation of changes as part of the

measurement for seizing. In comparison, Kump *et al.* (2019) measure implementing changes as items of transforming. In the studies using the term 'reconfiguring' instead of 'transforming' (Wilden *et al.*, 2013; Wilden and Gudergan, 2015; Jantunen *et al.*, 2018), reconfiguring (transforming) items include methods, strategy, and business process renewal (Wilden *et al.*, 2013; Wilden and Gudergan, 2015), or integration or extension of existing resources to new areas (Jantunen *et al.*, 2018); seizing is measured as investing, adopting, responding or reacting, developing or building the new, and changing the existing resources (Wilden *et al.*, 2013; Jantunen *et al.*, 2018).

As such, all the four studies measure sensing, seizing, and transforming through item-based scales. In other words, sensing, seizing, and transforming are implicitly understood as independent (uncorrelated) categories. I have already challenged the categorisation of activities into unique or siloed capabilities and wish to introduce the notion of evolutionary theory to explain how capabilities coevolve. Helfat *et al.* (2007) identified that dynamic capabilities can be evaluated on two dimensions: technical and evolutionary fitness. While technical fitness measures "how effectively a capability performs its intended function" (Helfat *et al.*, 2007, p. 7), evolutionary fitness was introduced to measure "how well the dynamic capabilities of an organization match the context in which the organization operates" (Helfat *et al.*, 2007, p. 7), and this is closely related to my research focus. While technical fitness enables firms "to separate the performance of a task from firm performance" (Helfat and Peteraf, 2009, p. 97), evolutionary fitness enables a firm "to make a living by creating, extending, or modifying its resource base" (Helfat *et al.*, 2007, p. 7).

Contexts	Items generated to measure sensing	Items generated to measure seizing	Items generated to measure transforming
General Scale (Kump <i>et al.</i> , 2019)	<p>Our company knows the best practices in the market</p> <p>Our company is up-to-date on the current market situation</p> <p>Our company systematically searches for information on the current market situation</p> <p>As a company, we know how to access new information</p> <p>Our company always has an eye on our competitors' activities</p>	<p>Our company can quickly relate to new knowledge from the outside</p> <p>We recognize what new information can be utilized in our company</p> <p>Our company is capable of turning new technological knowledge into process and product innovation</p> <p>Current information leads to the development of new products or services</p>	<p>By defining clear responsibilities, we successfully implement plans for changes in our company</p> <p>Even when unforeseen interruptions occur, change projects are seen through consistently in our company</p> <p>Decisions on planned changes are pursued consistently in our company</p> <p>In the past, we have demonstrated our strengths in implementing changes</p> <p>In our company, change projects can be put into practice alongside the daily business</p>
Marketing and technology capabilities (Wilden <i>et al.</i> , 2013; Wilden	<p><i>In my organisation...</i></p> <p>People participate in professional association activities</p> <p>We use established processes to identify target market</p>	<p><i>In my organisation...</i></p> <p>We invest in finding solutions for our customers.</p> <p>We adopt the best practices in our sector</p>	<p><i>How often have you carried out the following activities between 2004 and 2008?</i></p> <p>Implementation of new kinds of management methods</p>

and Gudergan, 2015)	<p>segments, changing customer needs and customer innovation.</p> <p>We observe best practices in our sector.</p> <p>We gather economic information on our operations and operational environment.</p>	<p>We respond to defects pointed out by employees.</p> <p>We change our practices when customer feedback gives us a reason to change.</p>	<p>New or substantially changed marketing method or strategy</p> <p>Substantial renewal of business process</p> <p>New or substantially changed ways of achieving our targets and objectives</p>
Digitalization (Jantunen et al., 2018)	<p><i>Activities for knowledge and resource acquisition and identifying opportunities.</i></p> <p>Observing trends in the topic area of the magazine</p> <p>Observing changes in people's values and lifestyles</p> <p>Looking for new opportunities in the operating environment</p> <p>Searching for new practices</p> <p>Conceptualizing new ways of doing business</p>	<p><i>Activities of patching, investing in research and development, building competencies, and implementing changes.</i></p> <p>We react to changes in our operating environment</p> <p>We actively develop new ways of doing business</p> <p>We continuously build complementary know-how</p> <p>We try to actively influence the direction of our business sector</p>	<p><i>Activities of knowledge, leadership, and human resource management, as well as re-allocating resources and assets.</i></p> <p><i>Please indicate how well the following statements describe your magazine organisation (0=badly; 100=well):</i></p> <p>Acquired know-how is integrated to the organisation</p> <p>Existing resources are used in new areas and in new purposes</p> <p>Existing know-how is used in new areas</p>
Business intelligence and analytics (BI&A)	Internal - Our BI&A capabilities allow our company to...	Shared Understanding - When an opportunity or threat is identified using BI&A, our company can...	N/A

<p>(Torres, Sidorova and Jones, 2018)</p>	<ol style="list-style-type: none"> 1. detect opportunities for improved efficiency or effectiveness in the company 2. sense the need to enhance the way our business works 3. be more aware of internal opportunities and threats 4. identify inefficiencies in existing business processes <p>External - Our BI&A capabilities allow our company to...</p> <ol style="list-style-type: none"> 1. sense opportunities and threats in the environment 2. identify opportunities for organisational change based on market conditions 3. be more aware of our environment 4. foresee a wide range of actionable options based on its surroundings 	<ol style="list-style-type: none"> 1. develop agreement among relevant stakeholders about the response 2. have relevant stakeholders agree on a response 3. get relevant stakeholders on the same page regarding the response 4. build consensus among relevant stakeholders for the response <p>Planning - When an opportunity or threat is identified using BI&A, our company can...</p> <ol style="list-style-type: none"> 1. develop a sound response plan 2. formulate an effective plan 3. create a strategy to capitalize on the situation 4. develop a viable action plan <p>Decision Making - When an opportunity or threat is identified using BI&A, our company can...</p> <ol style="list-style-type: none"> 1. be decisive about the course of action 2. make effective decisions about which course of action to pursue 	
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		3. quickly decide on the best course of action 4. decide on the appropriate course of action	
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Table 2-5 Items generated for measuring sensing, seizing, and transforming capabilities

2.3 Phenomenon: Digital Transformation

2.3.1 Historical Context

The first electronic, programmable, general-purpose digital computer, the ENIAC, short for Electronic Numerical Integrator and Computer, became operational in 1945 (Brainerd and Sharpless, 1948). Information technology (IT) then started to be applied in business environments in the 1950s, generating a new field of scholarship in management research (Nadkarni and Prügl, 2021). Starting with the impact of technology on business administration, Thompson and Bates (1957) proposed that technology affects business administration and processes; Thompson (1960) suggested that organisational structure controls administrative conflicts, which are rooted in technology. Existing organisational structures were not considered well adapted to the opportunities presented by information technology (Davis, 1971). The technology available limits the plausible organisational structures available (Thompson and Bates, 1957), and therefore influences organisation structure (Ford and Slocum, 1977). Harvey's (1968) research concluded that the less pervasive new technology is across the entire organisation, the more the firm develops specialised, independent business units, increases levels of hierarchy, and builds supervisory capabilities. Hickson *et al.* (1969) classified technology into three categories – operations technology, material technology, and knowledge technology – and found that operations technology was associated with organisational structure. Technology was also found to influence business planning (Hunt, 1970) and job characteristics (Slocum and Sims, 1980). For theorising purposes, Davis (1971) proposed a socio-technical system approach to organisational design to allow production organisations to adapt, and Jelinek (1977) argued that contingency theory had developed with the evolution of the concepts of technology, and proposed a multiple-technology model accordingly.

While the original research was mainly developed in the context of manufacturing firms (Gillespie and Mileti, 1977), and when the business environment was transitioning from a manufacturing-based to a service-based economy, technology created challenges in both manufacturing and service

organisations (Quinn and Paquette, 1990). In order to adapt, rather than narrowly focusing on the matter of technology (Adler and Sbenbar, 1990), there was a growing interest in organisational strategies relating to technology (Pava, 1983). IT extends the range of possibilities, facilitates an evolution in organisational design, and enables strategic benefits (Child, 1987). Scholars therefore discussed the strategic management of technology (Modesto and Robert, 1986). Businesses must develop strategies to respond to distinctive customer needs by leveraging technology rather than relying on technology-driven product proliferation (Igor Ansoff, 1987). When implementing new technological strategies, businesses can encounter difficulties in their traditional structures (Quinn and Paquette, 1990). Large companies face a key challenge in the strategic management of internet technology, which is building capabilities based on R&D and IT, and requires continuous learning (Pavitt, 1990).

Tim Berners-Lee debuted the first website on 6th August 1991, ushering in the World Wide Web as a publicly available service (Berners-Lee *et al.*, 1992), which initiated new digital journey for businesses and customers. Since then, IT-enabled organisational transformation has drawn increasing attention from management scholars (e.g., Benjamin and Levinson, 1993; Teng, Grover and Fiedler, 1994; Venkatraman, 1994; Markus and Benjamin, 1997), particularly in the emerging field of information systems (e.g., Coombs and Hull, 1995; Willcocks and Smith, 1995; Manzoni and Angehrn, 1997; Teo, Tan and Wei, 1997; Macredie and Sandom, 1999; Sarker and Lee, 1999; Seneviratne, 1999; Ward and Elvin, 1999; Sambamurthy and Zmud, 2000). IT played an important facilitating role in business process reengineering (BPR) (Teng, Grover and Fiedler, 1994), also known as process innovation, business process redesign, or business reengineering, as an IT-enabled organisational change, which was widely adopted by organisations and studied by scholars in the 1990s (Willcocks and Smith, 1995). The tension between strategic re-orientation and cost-saving was discovered to be a challenge during BPR (Coombs and Hull, 1995). A holistic perspective considers human aspects as well as technology in delivering BPR (Willcocks and Smith, 1995). A strategic path with two critical dimensions (i.e., degree of mediation and degree of collaboration) was proposed

for BPR (Teng, Grover and Fiedler, 1994). Conceptual frameworks for IT-enabled change were developed, emphasising the significance of organisational structure, process, people, strategy, and culture (Benjamin and Levinson, 1993; Markus and Benjamin, 1997). This early research regarding IT-enabled organisational transformation is argued to be one conceptual root of digital transformation thinking (Nadkarni and Prügl, 2021).

Digital transformation has been explored as an emerging and popular research field, with a substantial increase in publications from 2019 onwards (Hanelt *et al.*, 2021; Nadkarni and Prügl, 2021; Kraus *et al.*, 2022). Both industrial practice and academic research show an interest in addressing technological and organisational aspects of digital transformation (Nadkarni and Prügl, 2021), such as digital infrastructures (Ratner and Plotnikof, 2022) and digital platforms (Mikołajewska-Zajac, Márton and Zundel, 2022; Steinberg, 2022). Recently, special issues of academic journals have been published in this area: for example, the Journal of Product Innovation Management (Appio *et al.*, 2021) and Organization Studies (Beyes *et al.*, 2022).

There is a consensus in the research that digital transformation is not just about technology, and it alone is not sufficient to achieve business transformation (Kane *et al.*, 2015; Tabrizi *et al.*, 2019; Frankiewicz and Chamorro-Premuzic, 2020). Digital transformation incorporates strategy (Hess *et al.*, 2016; Ross, Sebastian and Beath, 2017; Sebastian *et al.*, 2017; He *et al.*, 2020; Menz *et al.*, 2021), management (Singh and Hess, 2017; Cennamo *et al.*, 2020; Singh, Klarner and Hess, 2020; Solberg, Traavik and Wong, 2020), organisation structure (Kretschmer and Khashabi, 2020; Smith and Beretta, 2021), business models (Hansen and Sia, 2015; Reinartz, Wiegand and Imschloss, 2019), innovation (Nambisan *et al.*, 2017; Nambisan, Wright and Feldman, 2019; Appio *et al.*, 2021; Del Giudice *et al.*, 2021), operations (Quinn *et al.*, 2016; Guenzi and Habel, 2020), new product development (Marion and Fixson, 2021), manufacturing (Aversa *et al.*, 2021), and organisational mindset and culture (Vial, 2019; Solberg, Traavik and Wong, 2020). Strategy is a key requirement for a successful digital transformation (Gurbaxani and Dunkle, 2019; Correani *et al.*,

2020; Kitsios and Kamariotou, 2021). Some argue that digital strategy is different from traditional strategic planning and relies on a perspective of emergent strategy-making (Chanias, Myers and Hess, 2019).

Digital transformation is different from previous IT-enabled organisational changes, since contemporary technologies are different, such as big data, artificial intelligence (AI) (Brock and von Wangenheim, 2019), the Internet of Things (Ceipek *et al.*, 2021), social media, cloud computing, and smartphones. The new technologies are far more open, flexible, and ubiquitous (Hanelt *et al.*, 2021). The theoretical models established accordingly may not explain the current phenomenon of digital transformation (Hanelt *et al.*, 2021). The established theoretical models may not fit the emergence of a new phenomenon, and thus may need to be altered (Busse, Kach and Wagner, 2017).

2.3.2 Definition of Digital Transformation

There has yet to emerge a widely accepted definition of digital transformation (Teichert, 2019; Kraus, Jones, *et al.*, 2021). From an industrial perspective, The Global Centre for Digital Business Transformation defines it as “organizational change through the use of digital technologies and business models to improve performance” (Wade, 2015, p. 3); while in the Journal of IT Professionals, it was defined as “the profound and accelerating transformation of business activities, processes, competencies, and models to fully leverage the changes and opportunities brought by digital technologies and their impact across society in a strategic and prioritized way” (Demirkan, Spohrer and Welser, 2016, p. 14). Some scholars have defined digital transformation as an organisational change process rather than a single step undertaken to upgrade specific functions of organisations (Feroz, Zo and Chiravuri, 2021), and moreover, it pertains to how companies run their business in many aspects rather than any one single process (Dörner and Edelman, 2015; Volberda *et al.*, 2021). Dörner and Edelman (2015) define digital transformation by breaking it down into three attributes: creating value at the new frontiers, optimising the processes that directly affect the customer experience, and building foundational capabilities that support the entire structure. Volberda *et al.* (2021) propose an integrated perspective for the

definition between three dimensions: cognition, routines, and organisational forms. Cognition is how executives look at the world, frame their decisions, and share this framing with relevant actors. Routines are the everyday patterns of behaviour of employees. Organisational forms are the formal structures and responsibilities that make coordinated effort possible. They argue that, to deal with the challenge of digital transformation, organisations need to overcome cognitive barriers, reconfigure routines, and introduce new organisational forms, and therefore define digital transformation as:

the use of new digital technologies to enable company-wide change (evolutionary versus transformative), involving the reframing of cognitive models of management (by envisioning new digital business models), the building of new digital routines (for the seizing of digital opportunities), and the implementation of new organizational forms (for setting up and integrating digital operations) for creating and appropriating new value in an established or new ecosystem. (Volberda *et al.*, 2021, p. 3)

Table 2-6 presents ten definitions of digital transformation from recent papers. The definitions focus on its cause, consequence, or effects (e.g., Feroz, Zo and Chiravuri, 2021; Gong and Ribiere, 2021; Hanelt *et al.*, 2021; Verhoef *et al.*, 2021), and/or its dimensions or attributes (e.g., Vial, 2019; Matarazzo *et al.*, 2021; Volberda *et al.*, 2021). Mergel, Edelmann and Haug (2019) propose that future research needs to develop a holistic approach for digital transformation rather than only considering the process or impact of digital transformation. While some develop their definitions from literature reviews (Vial, 2019; e.g., Gong and Ribiere, 2021), others establish the conceptualisation from empirical research (Mergel, Edelmann and Haug, 2019). For instance, Gong and Ribiere (2021) developed a unified definition based on a systematic literature review of 134 published definitions; Vial (2019) established a working definition based on

semantic analysis, reviewing 282 pieces of information systems literature. Mergel, Edelmann and Haug (2019) conducted expert interviews and developed a definition in the context of the public sector. This thesis takes the definition proposed by Gong and Ribiere (2021): “A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders” (Gong and Ribiere, 2021, p. 12). By ‘entity’, they mean an organisation, a business network, an industry, or society (Gong and Ribiere, 2021). Such a view interprets the phenomenon of digital transformation as a changing process leveraging key capabilities on a strategic level, emphasising resources and capabilities, which is in line with a dynamic capability perspective, therefore enabling us to potentially investigate dynamic capabilities during digital transformation.

Definition	Author(s)
The changes digital technologies can bring about in a company's business model, which result in changed products or organisational structures or in the automation of processes	Hess <i>et al.</i> (2016, p. 124)
The combined effects of several digital innovations bringing about novel actors (and actor constellations), structures, practices, values, and beliefs that change, threaten, replace, or complement existing rules of the game within organisations, ecosystems, industries or fields.	Hinings <i>et al.</i> (2018, p. 53)
An ongoing process of adoption to a significantly changing digital landscape in order to meet the digital expectations of customers, employees and partners	Teichert (2019, p. 1674)
A holistic effort to revise core processes and services of government beyond the traditional digitisation efforts	Mergel <i>et al.</i> (2019, p. 12)
A process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies	Vial (2019, p. 121)
A process driven by digital technologies where disruptions are triggered in organisations, and its impacts are enormous on the organisational value creation, strategy, and structure mechanisms	Feroz <i>et al.</i> (2021, p. 1531)
A fundamental change process, enabled by the innovative use of digital technologies accompanied by the strategic leverage of key resources and capabilities, aiming to radically improve an entity and redefine its value proposition for its stakeholders	Gong and Ribiere (2021, p. 12)
Organisational change that is triggered and shaped by the widespread diffusion of digital technologies	Hanelt <i>et al.</i> (2021, p. 1160)
The process that is used to restructure economies, institutions, and society at the system level	Matarazzo <i>et al.</i> (2021, p. 643)
A change in how a firm employs digital technologies, to develop a new digital business model that helps to create and appropriate more value for the firm.	Verhoef <i>et al.</i> (2021, p. 889)
The use of new digital technologies to enable company-wide change (evolutionary versus transformative), involving the reframing of cognitive models of management (by envisioning new digital business models), the building of new digital routines (for the seizing of digital opportunities), and the implementation of new organisational forms (for setting up and integrating digital operations) for creating and appropriating new value in an established or new ecosystem	Volberda <i>et al.</i> (2021, p. 3)

Table 2-6 Definitions of digital transformation

2.3.3 Digitisation, Digitalisation, and Digital Transformation

Digital transformation and digitalisation are commonly used terms in both industry and academia (Benavides *et al.*, 2020; Saarikko, Westergren and Blomquist, 2020; Ziyadin, Suieubayeva and Utegenova, 2020; Cappa *et al.*, 2021; Kraus, Schiavone, *et al.*, 2021; Lanzolla, Pesce and Tucci, 2021; Bygstad *et al.*, 2022; Nielsen, Mathiassen and Newell, 2022). Although they are used interchangeably in many cases, Matarazzo *et al.* propose that digitalisation is “the exploitation of digital opportunities”, whereas digital transformation is “the process that is used to restructure economies, institutions, and society at the system level” (Matarazzo *et al.*, 2021, p. 643). It is argued that digital transformation differs from digitisation and digitalisation (Feroz, Zo and Chiravuri, 2021) and Mergel, Edelmann and Haug (2019) suggest using the terms ‘digitisation’, ‘digitalisation’, and ‘digital transformation’ with clear differentiation.

Table 2-7 demonstrates the differences between digitisation, digitalisation, and digital transformation (Mergel, Edelmann and Haug, 2019; Feroz, Zo and Chiravuri, 2021), and the progression across digitisation, digitalisation and digital transformation as three stages (Verhoef *et al.*, 2021). Digitalisation is about the transition to digital services (Mergel, Edelmann and Haug, 2019). It involves automated routines and tasks (Feroz, Zo and Chiravuri, 2021). Verhoef *et al.* (2021) identify digitisation as the first stage, which encodes analogue information into a digital format of zeros and ones. Digitalisation goes beyond merely digitising existing processes or forms (Mergel, Edelmann and Haug, 2019). It is concerned with the digital components of products or services (Feroz, Zo and Chiravuri, 2021). Verhoef *et al.* (2021) identify digitalisation as the second stage, which is about using technology to alter existing business processes. Digital transformation is more comprehensive and involves cultural, organisational, and relational changes, such as new business models and digital platforms (Mergel, Edelmann and Haug, 2019; Feroz, Zo and Chiravuri, 2021). Verhoef *et al.* (2021) identify digital transformation as the third stage, since it is about a company-wide change leading to the development of new business models. As the most

pervasive phase (Verhoef *et al.*, 2021), the process of digital transformation will be reviewed below.

	Digitisation	Digitalisation	Digital Transformation
Differentiation (Mergel, Edelmann and Haug, 2019, p. 12)	To highlight the transition from analogue to digital services with a 1:1 change in the delivery more and the addition of a technological channel of delivery.	To focus on potential changes in the processes beyond mere digitizing of existing processes and forms;	To emphasize the cultural, organisational, and relational changes that we highlight in the outcomes section in order to differentiate better between different forms of outcomes.
Differentiation (Feroz, Zo and Chiravuri, 2021, p. 1531)	Digitisation is concerned with automated routines and tasks such as the conversion of analogue into digital information.	Digitalisation is the addition of digital components to product or service offerings ...	... and digital transformation is a more comprehensive introduction of new business models and digital platforms.
Three stages (Verhoef <i>et al.</i> , 2021)	Digitisation is the encoding of analogue information into a digital format (i.e., into zeros and ones) such that computers can store process, and transmit such information.	Digitalisation describes how IT or digital technologies can be used to alter existing business processes.	Digital transformation is the most pervasive phase, and describes a company-wide change that leads to the development of new business models, which may be new to the focal firm or industry.

Table 2-7 Digitisation, digitalisation, and digital transformation

2.3.4 Process of Digital Transformation

The process of digital transformation is conceptualised as an ongoing strategic renewal process (Warner and Wäger, 2019) and a strategic aligning process (Yeow, Soh and Hansen, 2018). Barriers of digital transformation are reviewed: these comprise organisational inertia, overly rigid strategic planning processes, and employees' resistance to change (Vial, 2019; Warner and Wäger, 2019). Enablers of digital transformation comprise cross-functional teams, fast decision-making, and executive support (Warner and Wäger, 2019). In order to develop and implement a digital transformation, maturity models are studied (e.g., Ifenthaler and Egloffstein, 2020). Maturity refers to "a state of being complete, perfect or ready" and is "the result of progress in the development of a system", and digital maturity specifically reflects the status regarding the performance of a company, achieved in order to adapt to the changing digital environment (Teichert, 2019, p. 1675). Teichert (2019) identified areas of digital maturity, including customer-centricity, innovation, data-driven decision-making, open culture, digital-first mindset, agility and flexibility, and collaboration.

Berman (2012) identified three paths to digital transformation (

Table 2-8). The first path relates to reshaping the customer value propositions: what value is to be delivered to customers. This path involves three sequential steps: enhance, extend, and redefine. The second path corresponds to transforming the operating model of the business: how the value is to be delivered to customers. This route starts with building digital capabilities, followed by leveraging digital insights across the company, and finally innovating the business model by integrating and optimising all digital and physical elements. The third path involves simultaneously pursuing the first and second paths to build new capabilities around the customer value proposition and operational model together as they transform. An organisation may choose one path to start with and then move to others based on three considerations: where the firm is in the industry, adoption levels and customer expectations, and the degree of integration at each stage. Successful digital transformation, in this perspective,

requires an essential capability to decide how to move between the paths (Berman, 2012).

DT	Stage 1	Stage 2	Stage 3
Path 1: Reshaping the Customer Value Propositions	Enhance products and services for a better customer experience.	Extend offerings for new revenue streams.	Redefine core elements for a radically reshaped value proposition.
Path 2: Transforming the Operating Model	Create new digital capabilities.	Leverage information to manage across the organisation.	Integrate and optimise all digital and physical elements.
Path 3: Combining two approaches by simultaneously transforming the customer value proposition and organising operations for delivery.			

Table 2-8 Strategic paths to digital transformation (Berman, 2012)

There is limited research into the process or stages of digital transformation. Teichert (2019), for example, could not find any extant research that he could include in his systematic review of digital transformation. Although there have been no clear descriptions of different stages during digital transformation (Teichert, 2019), granular descriptions regarding the progress of digital transformation can be derived from the literature. I conceptualised a four-stage process of digital transformation based on Berman's (2012) model regarding strategic paths to digital business transformation, integrated with a four-stage model of AI maturity developed by Etlinger (2018). The four stages are exploration, experimentation, modelisation, and integration, and from which the granular descriptions regarding different aspects of progress are derived.

During the exploration stage, initial investment is applied in technology, digital teams, and digital channels (Schwertner, 2017; Gill and VanBoskirk, 2023), while data-driven objectives are not yet clear, and sufficient data are not yet gathered (Etlinger, 2018). During the experimentation stage, experiments are used for daily activity optimisation, and a large volume and variety of data are collected, but remain siloed (Quinn *et al.*, 2016; Etlinger, 2018; McKinsey, 2020). During the modelisation stage, data collected are well interpreted, and good quantity and high quality insights are generated for modelling and prediction purposes (Etlinger, 2018). During the integration stage, digital transformation becomes mature and insights generated from big data are widely applied to the operation processes and business model (Mergel, Edelman and Haug, 2019; Feroz, Zo and Chiravuri, 2021; Verhoef *et al.*, 2021). For each stage, the features of five aspects are conceptualised, including customer value proposition, operational process, data-driven capability, data-driven innovation and digital culture. Firstly, customer value proposition evolves from little change, to enhance customer experiences, to extend revenue streams, and finally to reshape the value proposition (Berman, 2012). Secondly, operational processes evolve from little change, to create new capabilities, to leverage the process across the whole organisation, and finally to integrate all the elements (Berman, 2012). Thirdly, data-driven capabilities start from accumulating raw data, evolving to descriptive

and retrospective analytics, to predictive analytics, to finally become a competitive business data advantage (E. Prescott, 2016; Etlinger, 2018). Fourthly, data-driven innovation starts with an initial trial, moving to innovation in tactics (Gill and VanBoskirk, 2023), to strategic and tactical innovation (Demirkan, Spohrer and Welser, 2016; Tekic and Koroteev, 2019; Kitsios and Kamariotou, 2021), and finally to product and business model innovation (Teece and Linden, 2017; Bican and Brem, 2020; Ceipek *et al.*, 2021; Lanzolla, Pesce and Tucci, 2021). Fifthly, digital culture goes from being promising but not yet prioritised to being integral to the company, from initial fostering in the digital department to covering digital-related functions, to engaging with different functions and across the company, to finally encompass the whole business (Etlinger, 2018; Teichert, 2019). This four-stage digital transformation journey, yet to be validated by academic empirical research, is presented in Table 2-9 with the features of each stage profiled.

Stages	Stage 1	Stage 2	Stage 3	Stage 4
	Exploration	Experimentation	Modelisation	Integration
Description	Initial investment in technology, digital team and channels; data-driven objectives are not clearly defined; not enough data gathered.	Experiments are used for daily activity optimisation; Large volume and variety of data are collected, but remain siloed.	As data are well interpreted, sufficient quantity and high quality insights are generated for modelling.	Digital transformation reaches the mature stage; insights from data are widely applied to the operation process and business model.
Customer Value Proposition	Little change.	Enhance products and services for a better customer experience.	Extend offerings for new revenue streams.	Redefine core elements for a radically reshaped value proposition
Operational Process	Little change.	Create new digital capabilities.	Leverage information across organisation.	Integrate and optimise all digital and physical elements.
Data-driven Capability	Raw data accumulation.	Descriptive and retrospective analytics.	Integrated data predictive analytics.	Competitive business advantage.
Data-driven Innovation	Initial Trail.	Only Tactics.	Both strategic level and strategic level. From strategic level to tactical level.	Product innovation and business model innovation.
Digital Culture	Fostering digital culture.	Digital related functions.	Cross functions.	Whole business.

Table 2-9 Four stages of digital transformation (Berman, 2012; Etlinger, 2018; Mergel, Edelmann and Haug, 2019; Teichert, 2019; Feroz, Zo and Chiravuri, 2021; Matarazzo *et al.*, 2021; Verhoef *et al.*, 2021)

2.4 Digital Transformation as a Special Context for Dynamic Capability Research

This thesis maintains that digital transformation is a new context for dynamic capability research. Unlike the plethora of management change initiatives pursued over the past decades, digital transformation affects all aspects of the organisation and its management (Table 2-10), and does so in what Eisenhardt and Martin (2000) would consider a hyperdynamic environment.

Areas	Citations
Strategy	(Hess <i>et al.</i> , 2016; Ross, Sebastian and Beath, 2017; Sebastian <i>et al.</i> , 2017; He <i>et al.</i> , 2020; Menz <i>et al.</i> , 2021)
Management	(Singh and Hess, 2017; Cennamo <i>et al.</i> , 2020; Singh, Klarner and Hess, 2020; Solberg, Traavik and Wong, 2020)
Organisation structure	(Kretschmer and Khashabi, 2020; Smith and Beretta, 2021)
Business model	(Hansen and Sia, 2015; Reinartz, Wiegand and Imschloss, 2019)
Innovation	(Nambisan <i>et al.</i> , 2017; Nambisan, Wright and Feldman, 2019; Appio <i>et al.</i> , 2021; Del Giudice <i>et al.</i> , 2021)
Operations	(Quinn <i>et al.</i> , 2016; Guenzi and Habel, 2020)
New product development	(Marion and Fixson, 2021)
Manufacturing	(Aversa <i>et al.</i> , 2021)
Organisational mindset and culture	(Vial, 2019; Solberg, Traavik and Wong, 2020).

Table 2-10 The impact of digital transformation upon the firm

The complexity of digital transformation creates challenges for managers trying to operationalise it (Khanna, Guler and Nerkar, 2016; Wade and Vivier, 2018; Björkdahl, 2020; Kostis and Ritala, 2020). In the face of technological discontinuities (Tushman and Anderson, 1986), core capabilities that used to be competitiveness can become incumbent inertia (Lieberman and Montgomery,

1988) and core rigidity (Leonard-Barton, 1992). Employees can resist technology-enabled change in different ways (Lapointe and Rivard, 2005). From a psychological perspective, individual defence mechanisms are found to be positively correlated with behavioural intention to resist organisational change (Bovey and Hede, 2001). Resource-based theorists invoke path dependency (Vergne and Durand, 2011), and inertia and resistance are accordingly identified as organisational barriers to digital transformation (Vial, 2019).

Digital transformation is a process of continuous change in response to digital disruptions in the business environment (Vial, 2019). As a strategic solution to address rapidly changing environments, there is a consensus that dynamic capability is a helpful lens to unfold the phenomenon of digital transformation (Wheeler, 2002; Benner, 2009; Bharadwaj *et al.*, 2013; Shamim *et al.*, 2019; Coreynen *et al.*, 2020). Moreover, digital transformation can be framed as a resource-based process to respond to technological changes because it leverages (new) digital resources (Bharadwaj *et al.*, 2013), realigns existing resources with digital strategies (Yeow, Soh and Hansen, 2018), and redeploys slack resources (Du, Pan and Huang, 2016). Therefore, as a further extension of the RBV (Barney, 1991), the dynamic capability perspective provides a theoretical lens to unpack the phenomenon of digital transformation (Vial, 2019). It is also believed that developing new dynamic capabilities is one of the challenges for digital transformation (Zahra and George, 2002; Daniel and Wilson, 2003; Battleson *et al.*, 2016; Mikalef and Pateli, 2017; Helfat and Raubitschek, 2018; Warner and Wäger, 2019; Matarazzo *et al.*, 2021). This can be seen from the substantial increase in publications on digital transformation in 2019, with a continued trend in 2020, within which the most frequent keyword is 'dynamic capabilities' (Kraus *et al.*, 2022). A cluster of articles have tried to develop the link between dynamic capability perspective and digital transformation, particularly from a theoretical point of view (Kraus *et al.*, 2022). Appio *et al.* (2021) also argue that how digital technologies sustain and change the foundations of organisational learning and dynamic capabilities remains underexplored. They identified three levels of analysis (i.e., macro, meso, and micro) for future research, and at the meso-level, they propose that "external

organizational boundaries are building blocks of how the firm's structure their dynamic capabilities to embrace digital transformation" (Appio *et al.*, 2021, p. 11). They therefore propose an example research questions: "How does digital transformation pave the way for new types of learning and new approaches to developing dynamic capabilities?" (Appio *et al.*, 2021, p. 16).

From a dynamic capability perspective, Eisenhardt and Martin (2000) discussed two levels of market dynamism: moderately dynamic markets and high-velocity markets. In moderately dynamic markets, benefiting from predictable paths, relatively stable processes can be developed with linear steps: that is, from analysis to implementation. As a result, the pattern of dynamic capabilities in these markets is similar to the concept of routines with detailed, complicated, analytic processes and predictable outcomes. In high-velocity markets, business models are unclear, market boundaries are blurred, and players are shifting and ambiguous. Since these markets evolve rapidly, changes are less predictable than in moderately dynamic markets. Compared to learning before doing in moderately dynamic markets, they are characterised by learning by doing in high-velocity markets. That is, dynamic capabilities in these markets rely much more on real-time new knowledge rather than existing knowledge, which could even become rigidities if past experiences are overgeneralised. Due to less predictable paths, dynamic capabilities are therefore simple, instead of being robust and grooved, to avoid locking by specific routines and past experiences. As such, simple rules providing fragile semi-structure are developed to allow for rapidly situation-specific new knowledge creation and emergent adaptation. As a result, dynamic capabilities in high-velocity markets are more experiential and emergent (Eisenhardt and Martin, 2000). Given that digital transformation creates a type of high-velocity market for business, probably more than ever before, the extant knowledge of dynamic capabilities in this high-velocity market potentially needs to be renewed.

While, from a dynamic capability perspective, Eisenhardt and Martin (2000) believed that traditional RBV reaches a boundary condition in high-velocity markets and the patterns of dynamic capabilities vary depending on market

dynamism, Hanelt *et al.* (2021) in particular have challenged the boundary conditions for the phenomenon of digital transformation due to the uncertainties about the phenomenon. As a strategic solution to address rapidly changing environments, dynamic capabilities are considered fundamental during digital transformation (Kraus, Jones, *et al.*, 2021). Hanelt *et al.* (2021) raised the need to reassess the fit between digital transformation and the established theoretical models, especially in terms of field strategy. We cannot be sure whether our existing knowledge of organisational change covers digital transformation, since the empirical reality has changed (Hanelt *et al.*, 2021). Therefore, in order to utilise and advance the existing knowledge of the dynamic capabilities perspective, it is critical and urgent to re-examine the established dynamic capabilities framework in case it reaches a boundary condition in this new phenomenon of digital transformation. This is perhaps the most imperative and pervasive managerial challenge for incumbent firms of the last and coming decades (Gong and Ribiere, 2021; Nadkarni and Prügl, 2021). Hanelt *et al.* (2021) further proposed a research question in their research agenda to advance the dynamic capability perspective for digital transformation: “how do we need to adapt our understanding of dynamic capabilities when ordinary and dynamic capabilities merge due to the increased use of flexible and reprogrammable digital technologies?” (Hanelt *et al.*, 2021, p. 1180). Given that digital transformation is more comprehensive than mere digitisation or digitalisation (Mergel, Edelmann and Haug, 2019; Feroz, Zo and Chiravuri, 2021; Verhoef *et al.*, 2021), our existing understanding of dynamic capabilities needs to be re-examined in this new, special context. Therefore, the research question of the thesis is: How can the dynamic capability perspective evolve to better understand digital transformation?

3 COEVOLUTION OF DYNAMIC CAPABILITIES DURING DIGITAL TRANSFORMATION

3.1 Abstract

While digital transformation is often necessary to allow incumbent firms to remain competitive in a fast-changing digital world, in practice, it is plagued by high failure rates. The dynamic capabilities perspective was developed to address such rapidly changing environments and has been utilised as a foundation to improve the understanding of digital transformation. The three disaggregated clusters of dynamic capabilities (sensing, seizing, and transforming) identified by Teece (2007) are widely presented in an implicit, if not explicit, sequential order, consistent with traditional planning practice, making them appear easy to implement for digital transformation. However, given its high failure rate, digital transformation might be a more complex phenomenon than sequential models suggest. Therefore, the evolution of dynamic capability clusters throughout the digital transformation is explored in this chapter through a longitudinal case study.

It is found that sensing, seizing, and transforming, rather than being sequential, coexist and coevolve during digital transformation. When they evolve at different speeds, mismatches can occur, acting as both bottlenecks slowing down the transformation and catalysts that improve underdeveloped capabilities. Consequently, this study expands upon Teece's important contribution by identifying how mismatches arise during the coevolution of dynamic capabilities and their consequences in the context of digital transformation. It also contributes to practice by arguing that the manner in which firms orchestrate the coevolution of these dynamic capabilities over time is necessary for digital transformation success. I therefore suggest that managers should embrace the tensions caused by these mismatches, constructively orchestrating the three clusters of dynamic capabilities supporting digital transformation.

3.2 Introduction

Digital technologies are sweeping across industries, generating disruption for incumbents (Agarwal *et al.*, 2010; Ansari, Garud and Kumaraswamy, 2016; Skog, Wimelius and Sandberg, 2018; Reinartz, Wiegand and Imschloss, 2019). In response, many incumbents are engaging in digital transformation (Andal-Ancion, Cartwright and Yip, 2003; Sebastian *et al.*, 2017; Kammerlander, König and Richards, 2018) to gain a competitive advantage (Vial, 2019; Verhoef *et al.*, 2021). A global CIO Survey from Harvey Nash and KPMG (White and Bates, 2020) shows that more companies are increasing their IT investment to achieve better performance (from 25% in 2009 to 55% in 2020), and BCG (2020) reports that over 80% of companies plan to accelerate their digital transformation. Arguably, the COVID-19 pandemic has made digital transformation even more urgent and essential (KPMG, 2020; McKinsey, 2020; Althoff, 2021). Nonetheless, evidence indicates the challenges of realising value from digital transformation projects. For example, McKinsey (2018) found that the success rate of digital transformation was only 16% in 2018, and BCG (2020) reported that 70% of digital transformations fail to achieve their objectives. With an increased urgency to digitally transform, it is critically important to understand the challenges incumbents face when engaging in digital transformation.

Academic research identifies multiple challenges with digital transformation, including inertia, resistance (Vial, 2019), the need for rapid strategic planning, and the presence of a high level of hierarchy (Warner and Wäger, 2019). One of the challenges is to develop new dynamic capabilities for digital transformation (Daniel and Wilson, 2003; Battleson *et al.*, 2016; Mikalef and Pateli, 2017; Helfat and Raubitschek, 2018; Warner and Wäger, 2019). Dynamic capabilities, as an extension of the RBV (Barney, 1991), were initially defined as “the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (Teece, Pisano and Shuen, 1997, p. 516), and later re-defined as “the capacity of an organisation to purposefully create, extend, or modify its resource base” (Helfat *et al.*, 2007, p. 1). Comparably, digital transformation is a process of continuous change in response to digital disruptions from the business environment (Vial,

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2019), and can be framed as a resource-based process that responds to technological changes as it leverages digital resources (Bharadwaj *et al.*, 2013), and realigns existing resources with digital strategies (Yeow, Soh and Hansen, 2018). Therefore, a dynamic capabilities approach is an appropriate theoretical foundation for improving the understanding of digital transformation (Shamim *et al.*, 2019; Vial, 2019; Coreynen *et al.*, 2020).

From a dynamic capabilities perspective, Eisenhardt and Martin (2000) believe that the traditional RBV reaches a boundary condition in high-velocity markets and the patterns of dynamic capabilities vary depending on market dynamism, while Hanelt *et al.* (2021) in particular challenge the boundary conditions for the phenomenon of digital transformation due to its high level of uncertainties. As a strategic solution to address rapidly changing environments, dynamic capabilities are considered fundamental during digital transformation (Kraus, Jones, *et al.*, 2021). Hanelt *et al.* (2021) raise the need to reassess the fit between digital transformation and the established theoretical models, especially in the field of strategy. They propose a research question accordingly in their research agenda about advancing the dynamic capability perspective for digital transformation: how do we adapt our understanding of dynamic capabilities due to the increased use of digital technologies (Hanelt *et al.*, 2021)? I agree with Hanelt *et al.*'s (2021) suggestion that our existing knowledge of organisational change and the role of dynamic capabilities therein is hitting a boundary condition, given the profound nature of digital transformation. Therefore, this study asks the following question: How can the dynamic capabilities perspective evolve to understand digital transformation better?

The three disaggregated clusters, namely sensing, seizing, and transforming (Teece, 2007; Teece, Peteraf and Leih, 2016), represent one way of applying the dynamic capabilities lens to understand digital transformation (Teece, 2018a; Warner and Wäger, 2019). This framework regarding the disaggregation of dynamic capabilities is widely applied in empirical research and facilitates the understanding of dynamic capabilities through classifying activities (e.g., Kindström, Kowalkowski and Sandberg, 2013; Wilden and Gudergan, 2015;

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Jantunen *et al.*, 2018; Kump *et al.*, 2019). Sensing, seizing, and transforming are often conceptualised as a sequential set of activities (Gebauer, 2011; Teece, 2018a; Warner and Wäger, 2019). Nonetheless, there is evidence that transforming is a higher-order capability supporting the development of sensing and seizing (Birkinshaw, Zimmermann and Raisch, 2016), which challenges sequential models. Building upon the evolutionary theory of economic change (Nelson and Winter, 1982), path dependencies (Vergne and Durand, 2011) and learning processes (Zollo and Winter, 2002), dynamic capabilities are also examined from an evolutionary approach (Barreto, 2010; Fainshmidt *et al.*, 2016). From this perspective, sensing, seizing, and transforming can coexist and evolve concurrently (Katkalo, Pitelis and Teece, 2010), and the interaction between the three dynamic capability clusters provides an essential insight into how these capabilities develop (Roberts and Grover, 2012a, 2012b; Birkinshaw, Zimmermann and Raisch, 2016). Inferably, the sequential models of sensing, seizing, and transforming (Gebauer, 2011; Teece, 2018a; Warner and Wäger, 2019) need to be re-examined, and the coevolution of sensing, seizing, and transforming and their interactions during their evolution need to be investigated.

Therefore, this study answers the research question about how the dynamic capabilities perspective can evolve to understand digital transformation better by examining how the conventional conceptualisation of sensing, seizing, and transforming can be developed for the phenomenon of digital transformation. In particular, this research explores the coevolution and interaction between the three dynamic capability clusters in the context of digital transformation. To achieve this, a longitudinal case study of a company undergoing digital transformation was conducted. From its digital journey, it was observed that each of the three dynamic capability clusters coexisted and coevolved during digital transformation, challenging the conventional sequential conceptualisation of sensing, seizing, and transforming. It was found that when the three clusters evolved at different rates, mismatches occurred. These mismatches created bottlenecks, slowing down the digital transformation process, but also created tensions, which acted as catalysts to accelerate the development of the dynamic capability limiting the overall transformation.

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This research contributes to both theory and management practice. First, it contributes to the dynamic capabilities literature by taking an evolutionary perspective on sensing, seizing, and transforming capabilities. It reveals a developmental mechanism between the three capability clusters, facilitating the more successful deployment of dynamic capabilities. It thus contributes to the stream of dynamic capabilities literature that calls for research examining the transition between capabilities (Prange, Bruyaka and Marmenout, 2018). Second, it contributes to the digital transformation literature by developing a more nuanced understanding of digital transformation challenges caused by underdeveloped dynamic capabilities. This adds to the work of researchers who have developed process models illustrating successful digital transformation (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019) or have identified potential barriers (Vial, 2019; Warner and Wäger, 2019). Third, by recognising the challenges during the coevolution of dynamic capabilities, this research has implications for management practice with an aim to reduce the high failure rates of digital transformation. It is argued that the manner in which incumbents orchestrate the coevolution of dynamic capabilities and their match conditions over time is crucial in achieving digital transformation success. By differing from the sequential view, which tends to idealise the complex reality into simple process models, this research examines the digital transformation journey, reveals pitfalls, and provides an evolutionary approach for emergent strategy in contrast to traditional linear planning. I therefore suggest that managers should embrace the tensions caused by these mismatches, constructively orchestrating the three clusters of dynamic capabilities supporting digital transformation.

3.3 Theoretical Overview

3.3.1 Digital Transformation

Digital transformation can be defined as “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies” (Vial, 2019, p. 118). Digital transformation is not just technical: it includes most

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business domains, such as strategy (Hess *et al.*, 2016; Ross, Sebastian and Beath, 2017; Sebastian *et al.*, 2017; He *et al.*, 2020; Menz *et al.*, 2021), management (Singh and Hess, 2017; Cennamo *et al.*, 2020; Singh, Klarner and Hess, 2020; Solberg, Traavik and Wong, 2020), organisation structure (Kretschmer and Khashabi, 2020; Smith and Beretta, 2021), business models (Hansen and Sia, 2015; Reinartz, Wiegand and Imschloss, 2019), innovation (Nambisan *et al.*, 2017; Nambisan, Wright and Feldman, 2019; Appio *et al.*, 2021; Del Giudice *et al.*, 2021), operations (Quinn *et al.*, 2016; Guenzi and Habel, 2020), new product development (Marion and Fixson, 2021), manufacturing (Aversa *et al.*, 2021), and organisational mindset and culture (Vial, 2019; Solberg, Traavik and Wong, 2020). It is widely recognised that digital transformation is difficult to execute (Khanna, Guler and Nerkar, 2016; Wade and Vivier, 2018; Björkdahl, 2020; Kostis and Ritala, 2020). Inertia and resistance (Vial, 2019), relating to path dependency (Vergne and Durand, 2011) are identified as organisational barriers to digital transformation. In the face of technological discontinuities (Tushman and Anderson, 1986), core capabilities that are used to drive competitiveness can lead to incumbent inertia (Lieberman and Montgomery, 1988) and core rigidities (Leonard-Barton, 1992). Additionally, employees can resist technology-enabled change (Lapointe and Rivard, 2005). From a psychological perspective, individual defence mechanisms are positively correlated with behavioural intention to resist organisational change (Bovey and Hede, 2001). Despite identifying some barriers (e.g., inertia and resistance), existing research has not yet investigated them thoroughly in the context of digital transformation.

Academics theorising digital transformation have introduced process models illustrating successful cases (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019). Yeow, Soh and Hansen (2018) investigated tensions caused by misalignments between strategy and resources during digital transformation and developed a model for the aligning process. They found that significant resource reconfiguration can realign existing resources and emergent digital strategies. Warner and Wäger (2019) explored how incumbents build dynamic capabilities for digital transformation and discovered that digital transformation is “an ongoing

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process of strategic renewal” (Warner and Wäger, 2019, p. 55). They presented a sequential process model (from sensing through seizing to transforming), including identified internal enablers (cross-functional teams, fast decision-making and executive support) and internal barriers (rapid strategic planning, change resistance, high level of hierarchy). However, I posit that reality is more complex than these process models assume, making it critical to build upon these studies and develop a more nuanced understanding of the challenges that may occur as digital transformation progresses.

3.3.2 Dynamic Capabilities: The Framework of Sensing, Seizing, and Transforming

3.3.2.1 Why does the conventional sequential conceptualisation need re-examination?

Sensing, seizing, and transforming are viewed as the three capability clusters of dynamic capabilities (Teece, 2007). More specifically, *sensing* includes identifying, assessing and developing opportunities (particularly, scanning, creation, learning, and interpretive activities in order to tap, filter, shape and calibrate opportunities); *seizing* captures value by addressing opportunities through a changing resource base, including strategic decision-making amongst investment choices and business model selection; *transforming* manages threats and builds competitiveness through continued reconfiguration of the resource base (e.g., culture, routines and structure, top management leadership and managerial function, business model redesign and asset realignment) and is a continued renewal process for sustained profitable growth (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016).

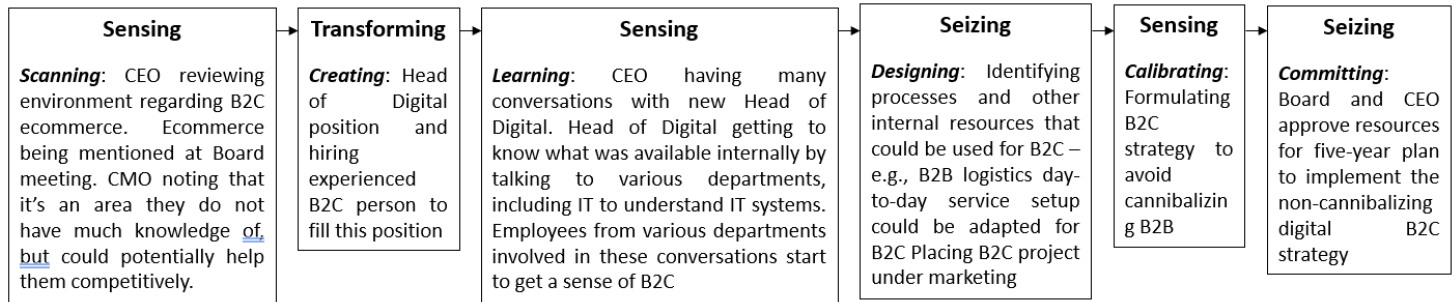
Although dynamic capability studies tend to present these clusters as a sequence from sensing to seizing, and then to transforming (Gebauer, 2011; Warner and Wäger, 2019), the sequence was purely conceptualised to frame their research rather than being examined or validated by the empirical data. Yeow, Soh and Hansen (2018) presented an empirical study investigating the alignment between resources and strategy in the digital context by applying the

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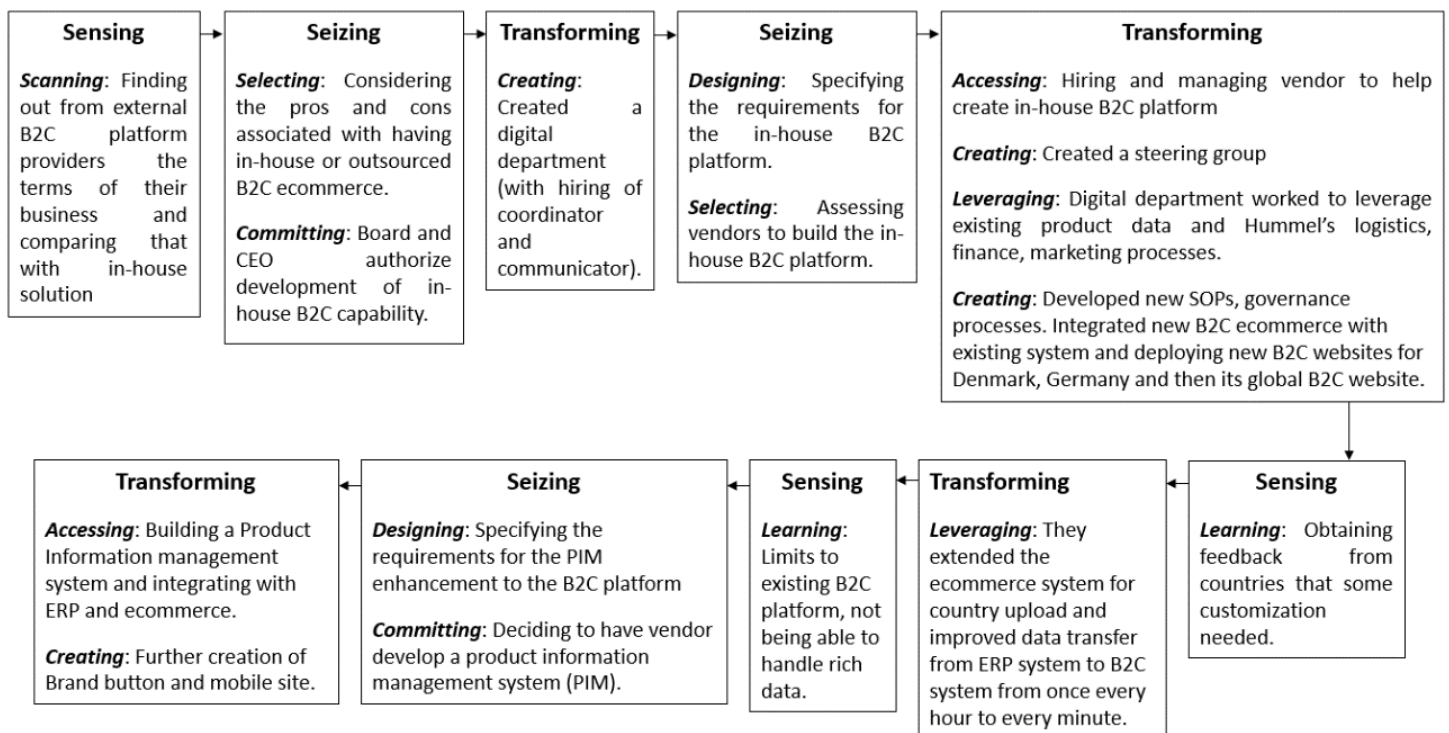
framework of sensing, seizing, and transforming with the conventional sequential conceptualisation. To their surprise, sensing, seizing and transforming were observed to occur in different proportions throughout the process (Yeow, Soh and Hansen, 2018). By revisiting the longitudinal data chronologically (Yeow, Soh and Hansen, 2018), I found that three dynamic capability clusters emerge forwards and backwards chaotically rather than in a predictable pattern (Figure 3-1). This revisiting and representation of their data (Yeow, Soh and Hansen, 2018) provides some initial empirical evidence in the digital context questioning the conventional sequential conceptualisation of sensing, seizing, and transforming. Therefore, I argue for the need to re-examine the conventional sequential model of the three dynamic capability clusters, thus further developing the framework of sensing, seizing, and transforming based on empirical validation.

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Phase 1: exploratory phase



Phase 2: building phase



Phase 3: extending phase

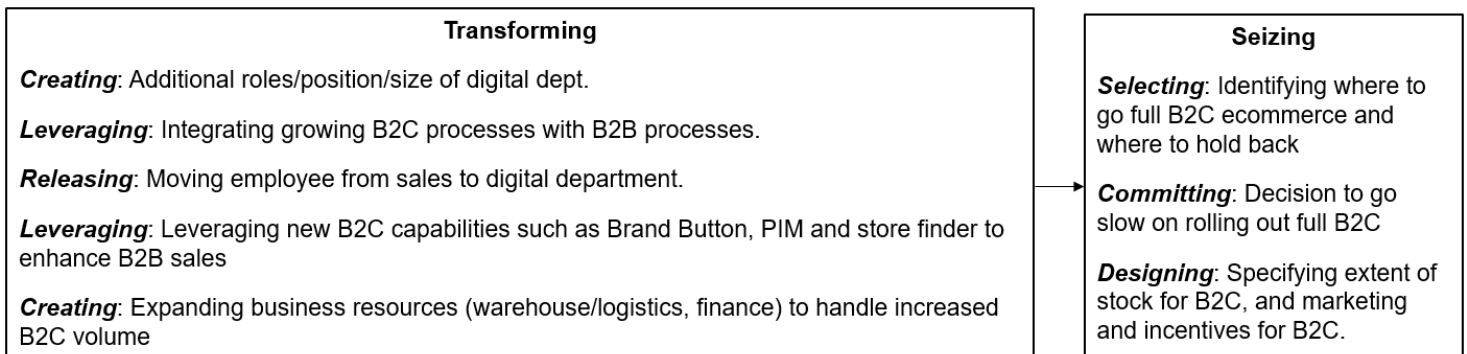


Figure 3-1 Representation of Yeow, Soh and Hansen's (2018) chronological data

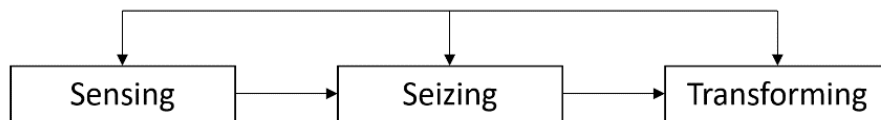
3.3.2.2 Are dynamic capabilities a sequence of sensing, seizing, and transforming?

Teece (2007) first presented sensing, seizing, and transforming, showing the interrelatedness between the three capability clusters (Figure 3-2 A). Specifically, he indicated that transforming is dependent on seizing, which, in turn, is dependent on sensing. However, the nature of the interrelationships between these capabilities in his model was not explicitly defined. Although Teece adopted the sequential process of the three capabilities for the case of business model innovation (Teece, 2018a), Teece, Peteraf and Leih (2016) also described the engagement with the three capabilities as “continuous or semi-continuous (but not necessarily sequential)” (Teece, Peteraf and Leih, 2016, p. 18).

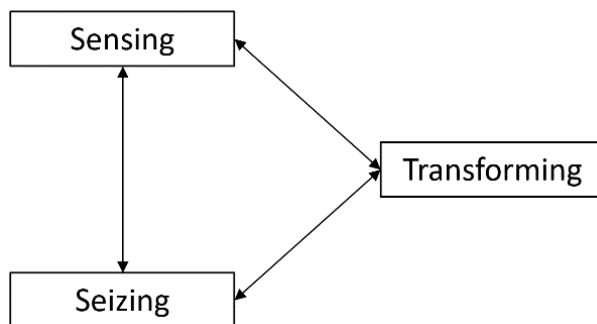
Among the variants of this model, Martin (2011) conceptualised sensing, seizing, and transforming as all interrelated with double arrows (Figure 3-2 B), while others (Gebauer, 2011; Teece, 2018a; Warner and Wäger, 2019) focused on a linear sequence (Figure 3-2 C). None of them explicitly discussed the relationships behind the arrows in their models, and they appeared to assume that the Teece capability clusters were sequential, perhaps because of the way they were originally visualised (Figure 3-2 A). Whilst correlations between sensing and seizing (Torres, Sidorova and Jones, 2018) and between sensing and reconfiguring (Wilden and Gudergan, 2015) have been tested in empirical studies, the conceptualisation of the relationships between sensing, seizing, and transforming needs to be further clarified.

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A (Teece, 2007)



B (Martin, 2011)



C (Gebauer, 2011; Teece, 2018a; Warner and Wäger, 2019)

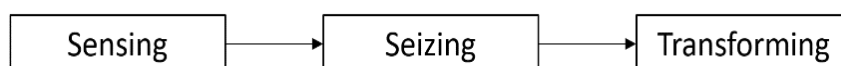


Figure 3-2 Models of sensing, seizing, and transforming

3.3.2.3 Introducing an evolutionary perspective to the framework

Research in strategy around coevolution, and around the evolution and coevolution of capabilities, involves multiple levels (e.g., firm level, industry level), attempting to illustrate how capabilities effectively evolve within firms as well as industries (Van den Bosch, Volberda and de Boer, 1999; Huygens *et al.*, 2001; Lewin, Weigelt and Emery, 2004). Coff (2010) examined how capabilities and bargaining power coevolve. Van den Bosch, Volberda and de Boer (1999) studied the coevolution of absorptive capacity, which is an important component of dynamic capabilities (Wang and Ahmed, 2007), and the knowledge environment. They discussed how two specific organisational determinants of absorptive capacity (i.e., organisation forms and combinative capabilities) interact over time and examined their combined effects at the firm level (Van den Bosch, Volberda and de Boer, 1999). A firm's capabilities evolve with the markets the firm serves, and the coevolution literature examines the linkage between firm capabilities and industries: for instance, certain market activity, or absence of such activity from industry, can result in the emergence, refinement, or decay of some firm capabilities (Levinthal and Myatt, 1994; Huygens *et al.*, 2001). Coevolution that involves multi-level interactions between firms and industry has therefore been examined (Levinthal and Myatt, 1994; Huygens *et al.*, 2001). Lewin, Weigelt and Emery (2004) categorised coevolution studies into three groups depending on the level explored: the firm level, which links firm capabilities to adaptation and survival, the meso level, which links to the institutional environment, and the theoretical level, which links to the macro environment.

As an important strategic management research area for digital transformation, selection and adaptation theories in the literature demonstrate two levels of research (i.e., the macro level and the firm level) that do not intersect (Lewin and Volberda, 1999; Lewin, Weigelt and Emery, 2004). Specifically, while strategy studies do not examine the macro level, population ecology theories do not investigate the firm level, and as a result, although there are coevolutionary dynamics both within and between firms, coevolution is often analysed at the population level rather than the micro level (Volberda and Lewin, 2003). However, adaptation and selection are fundamentally interrelated and coevolving, and

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therefore, coevolutionary mechanisms for organisational adaptation have been identified, illustrating that there can be an extensive variety of evolutionary paths of organisations (Volberda and Lewin, 2003).

One of the theoretical origins of dynamic capabilities is the evolutionary perspective (Barreto, 2010; Fainshmidt *et al.*, 2016). With the aim of addressing rapidly changing environments (Teece, Pisano and Shuen, 1997), dynamic capabilities develop as markets evolve (Eisenhardt and Martin, 2000). From an evolutionary perspective, the creation and evolution of dynamic capabilities are shaped by the assets possessed and by the evolutionary paths previously adopted or inherited (Teece, Pisano and Shuen, 1997; Barreto, 2010). Since “an evolutionary perspective does not only imply the study of a path over time but also recognises that many paths may coexist and interfere with one another” (Vergne and Durand, 2011, p. 372), it can be inferred that there may be more than one potential path of sensing, seizing, and transforming, and that their evolutionary paths may mutually influence each other. Therefore, the evolutionary paths of sensing, seizing, and transforming may not be linear.

Volberda *et al.* (2021) conceptualised a typology of digital transformation journeys including four paths by distinguishing the type of change between transformative and evolutionary and the strategic orientation in relation to the ecosystem between responding and shaping. They argued that the linear paths of digital transformation that are assumed by most studies are based mainly on anecdotal evidence. They emphasised the importance of the interplay between cognition, routines, and structure, as well as the need for coherent and interrelated changes between them, implying that, the digital transformation journey is not linear and there are various possible paths for it.

Reviewing the chronological data from the Yeow, Soh and Hansen (2018) study, the evolutionary paths of sensing, seizing, and transforming do not occur in a simple linear sequence (Figure 3-1). To the authors’ “surprise” (Yeow, Soh and Hansen, 2018, p. 55), different proportions of sensing, seizing, and transforming activities were observed over time. With an evolutionary framing, this observation may not be a surprise, since capabilities evolve concurrently.

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Katkalo, Pitelis and Teece (2010) stated, without further discussion, that sensing, seizing, and transforming are three capabilities that “evolve and coevolve with the business environment” (Katkalo, Pitelis and Teece, 2010, p. 1178). In the same vein, Birkinshaw, Zimmermann and Raisch (2016) disagreed with the three capabilities “forming an (approximately) linear sequence of same-order capabilities” (Birkinshaw, Zimmermann and Raisch, 2016, p. 39). They explored the relationship between sensing, seizing, and transforming over time through three longitudinal cases. Building upon Teece’s argument (2007) that sensing and seizing are two fundamental capabilities, they found that while “sensing and seizing are typically front-line capabilities”, transforming is “typically a higher-order capability” (Birkinshaw, Zimmermann and Raisch, 2016, p. 54). This provides empirical evidence that the evolution of sensing, seizing, and transforming may not be mutually exclusive and linear.

3.3.2.4 Recognising the need to match sensing, seizing, and transforming

Scholars taking an evolutionary lens typically frame firm capabilities within the area of organisational learning (e.g., Zollo and Winter, 2002; Barreto, 2010; Fainshmidt et al., 2016). Zollo and Winter (2002) investigated the mechanism by which firms develop dynamic capabilities, resulting in their proposing three learning mechanisms (i.e., experience accumulation, knowledge articulation, and knowledge codification). Organisational learning scholars often follow March’s (1991) distinction between exploration and exploitation (Van den Bosch, Volberda and de Boer, 1999). Exploitation is needed for an organisation’s current viability, and exploration is required for its future viability (Levinthal and March, 1993). Volberda and Lewin (2003) argue that, given that most firms show an asymmetric preference for exploitation, which focuses excessively on short-term performance, firms should consciously balance concurrent exploration and exploitation.

In turbulent and extremely competitive environments, such as in the context of digital transformation, capabilities developed from over-exploitation tend to become core rigidities and highly specialised resources that reduce flexibility (Volberda, 1996). While exploitation can improve short-term

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performance at the cost of flexibility, over-sensitivity can lead to being too responsive to environmental signals and continually changing routines, thus wasting resources, weakening identity, and reducing continuity over time (Volberda, 2006). In short, exploiting existing opportunities and exploring new opportunities are concurrent and coevolving processes, and should be balanced. Invariably, the three clusters of dynamic capabilities need to be consciously balanced or matched.

Some empirical evidence indicates the importance of matching sensing and seizing capabilities. Roberts and Grover (2012a, 2012b) found that “the higher the alignment (i.e., match, congruence, fit)” between customer-sensing and customer-responding capabilities, the more likely it was that a firm could “extract greater value from their overall customer agility capability” (Roberts and Grover, 2012b, p. 244). Birkinshaw, Zimmermann and Raisch (2016) argued that transforming is a higher-order capability that develops “as a way of getting the right level of coordination and balance between sensing and seizing” (Birkinshaw, Zimmermann and Raisch, 2016, p. 54). In these studies, a match is referred to as fit, alignment, congruence, coordination, or balance. Since dynamic capabilities “match the requirements of a changing environment” (Teece, Pisano and Shuen, 1997, p. 515), the term ‘match’ is used to imply the appropriate level, alignment and fit between the three dynamic capability clusters such that as they evolve, their individual outcomes restrain or reinforce the others.

Early in 1997, when the concept of dynamic capabilities was first developed, Teece, Pisano and Shuen (1997) suggested that “mismatch” between the existing and the new processes is a reason for the “frequent failure of incumbents to introduce new technologies” (Teece, Pisano and Shuen, 1997, p. 520). They recommended building a separate subsidiary, allowing the new processes to be developed while avoiding disruption to existing processes. Applying this to the case of digital transformation, building a separate digital hub or unit can be used to accelerate transformation without any mismatch issues between the incumbents’ traditional business processes and their new digital processes. However, these potential mismatches might be exposed later, during

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the integration stage. In other words, mismatches may be inevitable in the long run and matching different processes is crucial for digital transformation.

The way of measuring dynamic capabilities conceptualised by Helfat *et al.* (2007) also implies the significance of matching sensing, seizing, and transforming. In particular, they conceptualised “technical fitness” as an internal measure and “evolutionary fitness” as an external measure for the performance of dynamic capabilities (Helfat *et al.*, 2007). *Technical fitness* measures “how effectively a capability performs its intended function” (Helfat *et al.*, 2007, p. 7); thus, it enables firms “to separate the performance of a task from firm performance” (Helfat and Peteraf, 2009, p. 97). Since seizing capabilities tend to have an intended function to capture value by addressing particular opportunities (Teece, Peteraf and Leih, 2016), technical fitness can be inferred to relate more to seizing capabilities. Since dynamic capabilities are “context dependent”, *evolutionary fitness* was introduced to measure “how well the dynamic capabilities of an organisation match the context in which the organisation operates” and “enables an organisation to make a living by creating, extending, or modifying its resource base” (Helfat *et al.*, 2007, p. 7). Evolutionary fitness indicates the contextual performance over time through resource base reconfiguration. Given that transforming involves continued renewal (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016), it can be inferred that evolutionary fitness relates more to transforming capabilities.

Helfat and Peteraf (2009) argued that a firm might possess a dynamic capability but not necessarily use it; the dynamic capability possessed may be poor in technical fitness; and even with high technical fitness, it may not lead to high firm performance due to poor evolutionary fitness (Helfat and Peteraf, 2009). Given that seizing relates to technical fitness and transforming relates to evolutionary fitness, Helfat and Peteraf’s (2009) argument can be translated into language relating to the framework of sensing, seizing, and transforming as follows: a firm might sense some opportunities, but they may not seize them successfully due to poor technical fitness; even if they can seize some opportunities successfully with high technical fitness, they may fail in terms of

transforming due to poor evolutionary fitness. Thus, it can be inferred that, for dynamic capabilities to perform, it is critical that sensing, seizing, and transforming are matched.

3.3.2.5 Orchestrating sensing, seizing, and transforming

Dynamic capabilities play an important role in organisations' internal and external alignments. Externally, dynamic capabilities address external changes, aligning organisational capabilities with external market opportunities (Felin and Powell, 2016) or aligning organisation resources with customer needs (Teece, 2018a). Internally, dynamic capabilities are closely linked to organisation strategies, so they can be reflected in the alignment between resources and strategies (Wang and Ahmed, 2007; Yeow, Soh and Hansen, 2018), and between strategies and structures or systems (Wilden *et al.*, 2013; Felin and Powell, 2016; Teece, 2020).

Since dynamic capabilities have a role in configuring resources, they convey the importance of asset or resource alignment in response to changing environments (Helfat and Peteraf, 2015; Qaiyum and Wang, 2018). This requires cospecialised tangible and intangible assets as well as cooperative activities across the organisation (Augier and Teece, 2009; Helfat and Peteraf, 2015). Since a set of assets working jointly can generate more value than such assets working in isolation, Teece (2018b) introduced the concept of cospecialisation. The configuration function of dynamic capabilities demands the coordination of cospecialised assets (Sirmon *et al.*, 2011). Therefore, it can be inferred that, as part of organisational intangible assets, sensing, seizing, and transforming capabilities are required to perform as a set of joint or cospecialised assets in order to create more value than that from managing each asset in isolation and so achieve the differentiated competitiveness of dynamic capabilities.

Cospecialisation implies viewing the three clusters as a system that generates greater value than each of them separately. The coevolutionary perspective assumes that change may occur in all interacting elements within a system, and these changes are driven by the interactions between elements and

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the feedback from the rest of the system (Volberda and Lewin, 2003). While organisations can be viewed as sub-systems of the larger business ecosystem, given that Teece invokes a systematic approach (Boulding, 1956) as one of the intellectual origins of dynamic capability (Teece, 2018b), dynamic capabilities can be seen as sub-unit systems in their own right within organisations.

Based on the coevolutionary perspective (Volberda and Lewin, 2003), it can be deduced that the interactions between sensing, seizing, and transforming capabilities shape the evolutionary paths of dynamic capabilities. Therefore, in order to develop an evolutionary path that progresses their digital transformation, management needs to consciously manage the interactions between the three clusters to match them up as a dynamic capability system.

Although orchestration has been well discussed in relation to assets and resources (Sirmon *et al.*, 2011; Teece, 2012, 2020; Helfat and Peteraf, 2015), as firm resources, the orchestration dynamics of sensing, seizing, and transforming capabilities have not been identified or researched. Helfat and Peteraf (2015) defined asset orchestration as “the selection, configuration, alignment, and modification of tangible and intangible assets” (Helfat and Peteraf, 2015, p. 842). Teece (2012) referred to asset orchestration as the identification of complementarities, buying or developing missing assets, and asset alignment, coalignment, realignment, and redeployment. Sirmon *et al.* (2011) summarised asset orchestration as two dimensions: search and selection, as well as configuration and deployment (Helfat *et al.*, 2007), which are derived from the dynamic capabilities perspective (Adner and Helfat, 2003).

Teece (2007) suggested that the organisational and managerial processes for dynamic capabilities can be seen as an asset orchestration processes supporting sensing, seizing, and transforming. Teece (2020) also proposed that transforming capabilities are particularly responsible for asset orchestration, maintaining the coherence of the internal elements within the organisational system. There appears to be a consensus that dynamic capabilities play a role in semi-continuous (or periodic), if not continuous asset (or resource), orchestration (Teece, 2007, 2012, 2014; Helfat and Peteraf, 2015; Teece, Peteraf and Leih,

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2016). While dynamic capabilities play a critical role in achieving asset or resource orchestration, examining how dynamic capabilities can function properly to realise this role is meaningful. Consistent with the strategic role of dynamic capabilities, it is argued that the manager's role is the most underdeveloped element in the RBV (Sirmon *et al.*, 2011). Since dynamic capabilities themselves are also part of a firm's assets or resources, it can be deduced that sensing, seizing, and transforming capabilities demand orchestration if they are to work together collaboratively and collectively to function properly. Orchestrating sensing, seizing, and transforming capabilities can be inferred as the function of dynamic capabilities and as a prerequisite for dynamic capabilities to function. However, how managers orchestrate the three clusters to form evolutionary paths of dynamic capabilities has not yet been examined.

In summary, from a coevolutionary perspective, it can be deduced that sensing, seizing, and transforming capabilities coevolve and orchestrate to achieve their function and performance. They interact with each other on a micro level, in order to function collectively and collaborate harmoniously as a dynamic capability system on a macro level. The collaborative and interactive natures between the three clusters demonstrate the orchestration dynamics of sensing, seizing, and transforming capabilities (Figure 3-3). These orchestration dynamics between the three clusters shape the evolutionary paths of dynamic capabilities.

In order to orchestrate the three dynamic capability clusters, it is crucial to understand the interrelationships between them. Previous studies used the term "complementary" to imply the relationship between sensing, seizing, and transforming. Birkinshaw, Zimmermann and Raisch (2016) argued that transforming acts as a "complementary" higher-order capability. Roberts and Grover (2012a, 2012b) argued that customer sensing and responding capabilities are "complementary" dimensions of customer agility. Although both proposed sensing, seizing, and transforming as complementary capabilities, neither investigated their complementary relationship; the term "complementary" fails to specify their interactions or interdependencies during their evolution.

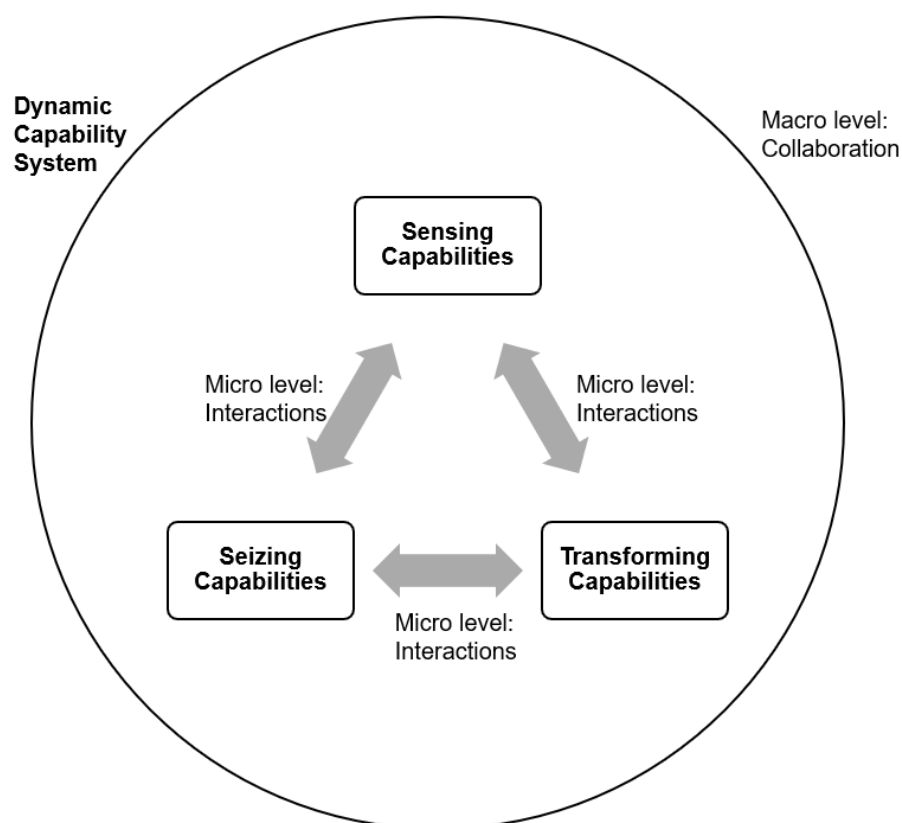


Figure 3-3 Orchestration dynamics: collaboration and interaction

3.4 Methodology

3.4.1 Research Philosophy

This research aims to understand the phenomenon of digital transformation, which can be interpreted in subjective and multiple ways. The conceptualisation of dynamic capability perspective-taking is constructed and interpreted by scholars based on their understanding. I believe that there is no single methodology that can reach the truth of a phenomenon consistently. In other words, this thesis takes the interpretivist research paradigm, which believes that the way of gaining an understanding of social world is subjective, and emphasises understanding phenomena from the perspective of individuals (Walsham, 1995; Goldkuhl, 2012).

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In particular, this research attempts to gain nuanced knowledge about the challenges incumbents face when engaging in digital transformation and understand how the dynamic capabilities perspective can evolve to better digital transformation. I believe that digital transformation is a social reality relating to situations, and understanding it is based on the experiences of individuals. This thesis tries to understand how this social reality appears to people in changing digital situations and interpret it. This study follows the philosophical stance of interpretivism, emphasising qualitative data, and focuses on context. Accordingly, I conducted one single case study, collected in-depth qualitative data, and decoded the meaning of the data to interpret the phenomenon of digital transformation.

3.4.2 Research Design

This research has been conducted as a longitudinal (Pettigrew, 1990) case study (Yin, 2014) to allow for a deep understanding of the evolution of sensing, seizing, and transforming capabilities over time. This also responds to the call for longitudinal studies in the literature on dynamic capabilities (Easterby-Smith, Lyles and Peteraf, 2009). Multiple data sources, including observation, interviews, and documents, were used. Non-participant observation in related areas involved observing working processes, shadowing employees' work activities, and attending internal and external meetings, presentations, training, and exhibitions. Unstructured interviews (Janz, 1982; Chauhan, 2022) were initially conducted for the first year of data collection in order to gain richness of data with more detail and nuance about the phenomenon, and avoid leading the research with a preconceptual academic framework. Semi-structured (Kallio *et al.*, 2016) interviews were then used for the last two years of data collection to maintain flexibility and also bring a degree of focus. Key participants included the general manager of digital function, the heads and managers of different groups in the digital team, and the directors of relevant departments (IT, marketing, product design, finance, and human resource departments). Documents related to its digital journey were reviewed. Triangulation across these different sources

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of information and data enhanced the credibility and validity of the qualitative research results.

Data analysis followed the Gioia method, a systematic and rigorous approach to develop new concepts that was designed for inductive research (Gioia, Corley and Hamilton, 2013). The groundwork for the Gioia method is conducted with a guiding research question and interviews to collect both retrospective and real-time data. The style of research is to “get in there and get your hands dirty” (Gioia, Corley and Hamilton, 2013, p. 19), which means madly and conscientiously making notes using informants’ terms, not researchers’, to understand informants’ lived experiences. Gioia, Corley and Hamilton (2013) suggested that researchers should conduct interviews and analysis in parallel (Gioia, Corley and Hamilton, 2013). Therefore, the Gioia method combined with the longitudinal method was used for data collection and analysis to improve its rigor for this inductive qualitative research.

3.4.3 Case Company

Company Z, established in 2007, is a London-based shoe company, designing, producing, and selling shoes globally. It is equipped with a high-end product line benefiting from biomechanical technology in the soles of the shoes. It markets its brand with both comfort and fashion in mind. Company Z initially sold through retailers and distributors rather than directly from the company. Company Z built its business globally through wholesalers and large retailers.

As its traditional retailers started to lose share to online competitors, the Company’s channel strategy was limited in its ability to offer a comprehensive range and new styles to consumers, since its retail channel was contracting, rationalising ranges. A consequence of having only a limited range of historical best sellers to consumers was to restrict Company Z’s ability to remain fashionable, sell more to existing consumers, and even recruit new consumers to its franchise.

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For example, Company Z's shoes were previously sold in a major US retail chain, but were then moved to the retailer's online store only. The retailer no longer carried inventory: it either bought stock on consignment or as online sales came in. On the one hand, this extended Company Z's product offer beyond the footfall of the retailer, but on the other hand, Company Z took all of the inventory risk in this case, because the retailer only paid for the product after it had been sold to the customers.

Experiencing the effects of the transition from physical stores to online retailing, Company Z decided to adapt to the changing environment by starting to sell directly to consumers online in 2010. Its hypotheses were that online retailing would continue to grow, and that the customer data accrued would provide customer insights that would further drive product selection and development. Sales data gathered online showing that Company Z is meeting customer needs may also be used to persuade third-party retailers to place products in their physical stores rather than only in their online space.

As the digital journey develops, Company Z expects to address a further problem with the distributor model regarding analytics. Because Company Z did not directly transact with the end customer, it could not gather data itself. Instead, it had to rely on data provided by the third party. Such data could be deficient in terms of quality and reliability, since it is filtered through the ability and bias of the third party. To quote the Global Market Director at Company Z: *"Because if they don't give you sell-out data, then you're not getting in an indication of what the consumers actually want, you are hearing what they want to tell you"*. The lack of customer insights was thought to be limiting the growth of the business. Therefore, it initiated a formal and ambitious project of digital transformation in 2018.

Figure 3-4 demonstrates the timeline of Company Z's digital journey between 2010 and 2018, which is before the data collection for this thesis started. When I started to engage with Company Z in 2018, it planned to launch its "Digital First" strategy and a formal project of digital transformation with both enthusiasm and difficulties. The difficulties it encountered makes Company Z a good case

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study for this thesis, which aims to develop a nuanced understanding of the challenges that may occur as digital transformation progresses. Its great enthusiasm for the transformation allowed me an opportunity to engage intensively with it for a longitudinal case study over the years needed to observe the phenomenon of interest. Appendix A provides more details for the case company's background and key activities it conducted during its digital journey.

THE 'DIGITAL' JOURNEY



Figure 3-4 Timeline of digital journey by 2018 from Company Z's internal documents

3.4.4 Data Collection

I collected data between October 2018 and October 2021, investigating the period between 2010 and 2021, with a strong focus on the last three years, as the digital transformation was underway (Figure 3-5). In other words, the case company started its digital journey in 2010, but it was not until 2018 that it recognised that it was embarking upon a digital transformation. The data collection started in 2018 when the case company strategically initiated its digital

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transformation programme. The data collection was completed in 2021, when data saturation was reached. I worked with the case company for three years, from 2018 to 2021, collecting real-time longitudinal data on its digital transformation. As regards the digital journey before 2018, the data were collected retrospectively. Data referring to the period prior to data collection were generated through historical documents and by asking participants for their recollections, whereas the data collected during the focal period were based upon interviews, direct observation and collected documents.

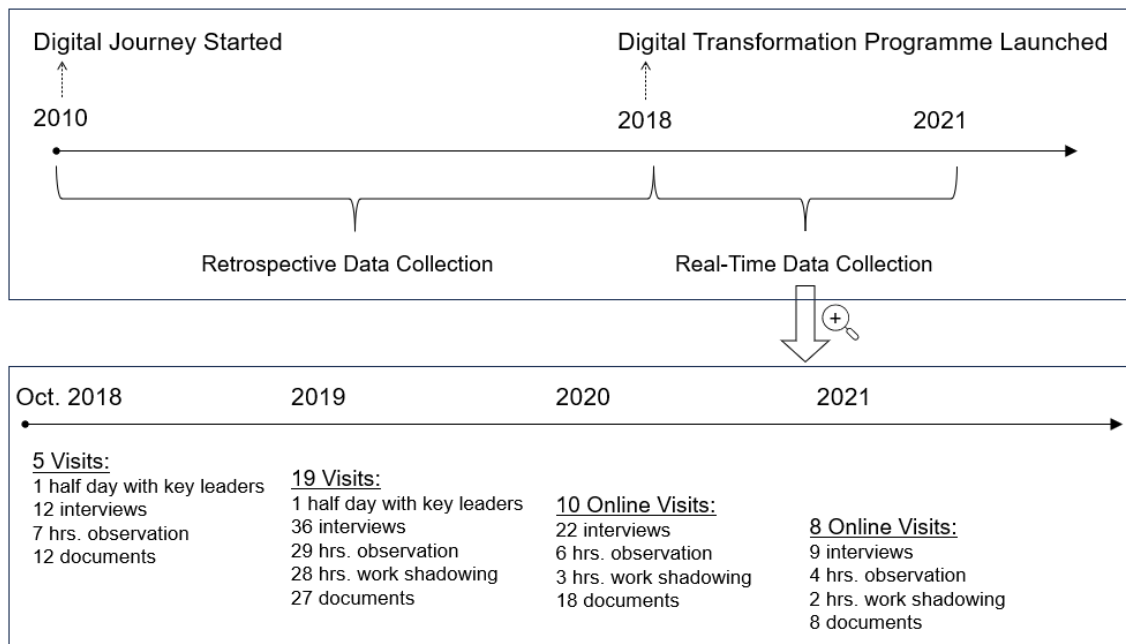


Figure 3-5 Timeline of data collection

The engagement with the company at the beginning of the data collection in 2018 was exploratory, gaining an understanding of the history and background regarding the digital journey of the case company before 2018 as well as its actions as it was undertaking a “Digital First” strategy, a digital transformation project in 2018. The data collection started from a half-day visit guided by the key leaders formed for the digital transformation project at Company Z, including the Chief Operating Officer, Global IT Director, Global People Director, Global Digital Director, and Global Marketing Director. I then worked with the digital team,

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interviewing the team leader and senior managers, as well as some juniors, in order to develop a full picture of Company Z's digital journey.

The relevant people involved were selected based on research needs using a snowball sampling method in order to collect as much relevant data as possible in more detail and nuance from the case company. I secured privileged access from two Board members, including the one assigned to lead digital transformation. These people introduced me to managers involved with the project and invited me to attend many key meetings and progress meetings. As a result of this, I was introduced to other managers in Company Z who were either contributing to, or affected by, digital transformation activities. In three years, I reached saturation, and more interviews with new people added very little to my understanding.

I observed some of the digital transformation teams' weekly meetings. Relevant documents were shared by the team from the participants or by their recommendations during the course regarding organisation structures, backgrounds, and history of its digital journey. As a result, I collected data regarding how the managers sensed the digital business environmental changes, how they interpreted these external changes, how they planned to respond to them, and what results they expected.

Through the initial data collection from the first few months, I gained insights into the intentions of the top and senior management for the digital transformation project. To understand how the project was being operated in more detail, I deeply immersed myself with the digital team from the beginning of 2019. I focused on following up the digital strategies and plans collected from 2018, and monitored whether any new events were happening. Benefiting from the immersive experience with the company, the struggles of implementing the digital transformation were observed through interviews, non-participant observations, and work shadowing.

Observing meeting and presentations provided data around the team's plans, actions, and results. Interviews offered individual perspectives based on participants' functional positions. Work shadowing provided more details on the

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data that came up from the interviews, as well as some new data that had not arisen from the observations or interviews. For instance, from work shadowing, I found that the digital insight group experienced stress in utilising all the technologies introduced by the management, and the digital marketing team could not balance their workloads between highly prioritised digital incubator tasks and their daily routine marketing tasks for a quite long period; the digital project delivery group were overwhelmed by the tasks added to their to-do list by their leader at the cost of losing priority for the most important and profound tasks. These data provided critical information regarding the challenges of digital transformation.

As well as working with the digital team, I also connected with other relevant departments when observing their cooperation with the digital team and needing to gain insights from other stakeholders' perspectives, such as the IT department, one of the key teams leading the digital transformation project, and I also had close cooperations and interactions with the digital team. The brand and marketing departments also interacted regularly with the digital marketing and trading groups within the digital team. I observed two meetings and three discussions between them in addition to the individual interviews, and also spent two days with the brand and marketing department shadowing their work. The observation and work shadowing supported the interview data with more details regarding the tension between the brand department and the digital team. While the former focused upon the high-end brand image, the latter was pushed by short-term revenue. These data provide important pieces for developing the full picture of digital transformation at Company Z from different stakeholders' perspectives.

In summary, approximately 160 hours (20 days) of onsite experience were accrued, including observations and interviews, 61 hours of interviews, 33 hours of work shadowing (Table 3-1), and 46 hours of other types of non-participant observation (Table 3-2); 65 documents (Table 3-3) were collected. Additionally, two half-day visits were hosted by key leaders of the digital transformation project (Chief Operating Officer, Global IT Director, Global People Director, Global Digital

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Director, and Global Marketing Director) from Company Z at headquarters. As a result, 41 participants from Company Z were involved, and almost half a million words were transcribed.

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Titles or Functions involved	Hours of interviews	Hours of work shadowing
Key Leaders		
Digital General Manager (Digital GM)	8.5	0
Global IT Director	3	0
Global People Director	1	0
Global Marketing Director	3	0
Global Digital Director (.Com)	3	0
Global Digital Director (B2B)	2	0
<i>Subtotal</i>	<i>20.5</i>	<i>0</i>
Digital Function		
Digital Marketing	4	6
Trading	2	1
Digital Merchandising	3	1
Customer Service	3	3
Customer Experience	3	1
Customer relationship Management (CRM)	3	1
Digital Insights and Optimisation	5	5
Digital Development	1.5	0
Digital Finance	0.5	0
Project Management	3	0
Product Delivery	2.5	0
<i>Subtotal</i>	<i>30.5</i>	<i>18</i>
Other Relevant Functions		
Brand and Marketing	4	5
IT	3	6
Product Design	2	4
Finance	1	0
<i>Subtotal</i>	<i>10</i>	<i>15</i>
Total	61	33

Table 3-1 Hours of interviews and work shadowing by roles and functions

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Hours of observations	
Meetings	
Monday trading meeting within the digital team	4
Weekly digital trade meeting across the whole company	3
Digital and brand marketing meeting for collaboration	1
Digital and brand marketing meeting in affiliate and social media	1
Brand marketing and digital trading meeting for promotion collaboration	1
Brand marketing meeting with product design	1
Digital incubator meeting	1
Product delivery weekly meeting	1
Digital and brand marketing meeting with digital marketing agency	1
Digital marketing meeting with influencer agency	1
Digital marketing weekly meeting with digital marketing agency	1
Digital marketing weekly meeting with agency about SEO	1
<i>Subtotal</i>	<i>17</i>
Presentations	
Incubator presentation for the whole company	2
Digital presentation by digital GM (B2C and B2B)	1
Digital First presentation by digital GM (B2C and B2B)	1
<i>Subtotal</i>	<i>4</i>
Training	
Google Analytics Training	3
<i>Subtotal</i>	<i>3</i>
Exhibitions	
Mary Quant exhibition with product design	2
<i>Subtotal</i>	<i>2</i>
Others	
Daily working process/activities	20
<i>Subtotal</i>	<i>20</i>
Total	46

Table 3-2 Hours of non-participant observation by activities (excluding work shadowing)

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Files	Numbers of files
General files for the company	4
Digital team	42
Brand and marketing	15
IT	3
Finance analysis	1
Total	65

Table 3-3 Numbers of files collected as documents by functions

3.4.5 Data Analysis

First of all, for anonymity, the interviewees were coded (Table 3-4).

Codes	Titles of Interviewees
A1 – A5	Top management, including chief officers and general managers
B1 – B7	Director level across digital, marketing, IT, and product design
C1 – C21	Heads, managers, and executives in digital
C22 – C28	Heads, managers, and executives in related departments, including marketing, IT, and finance.

Table 3-4 Codes of interviewees at Company Z (2010-2021)

A longitudinal analysis was conducted to identify five stages over time in order to prepare the data for Gioia analysis. Following the Gioia method, I engaged in a three-stage data analysis process: in stage one, the first order analysis, an overwhelming number of informant terms, codes and categories emerged, which were then synthesised to reduce the categories to a manageable number based on their similarities and differences; in stage two, I labelled the categories at a more abstract level, generating second order themes; in stage three, the second order themes were further distilled to aggregate dimensions and these dimensions were analysed. As Gioia, Corley and Hamilton (2013) suggest: at stage one, it is important to get lost and “You gotta get lost before you

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can found” (Gioia, Corley and Hamilton, 2013, p. 20); in stage two, it is critical to profoundly question how the emerging themes suggest concepts that might help to explain the phenomenon and answer the research question in the theoretical realm. Benefiting from the Gioia analysis, the third-order aggregate dimensions were ready to be analysed to explain the phenomenon and answer the research question. In particular, sensing, seizing, and transforming capabilities were coded over time, and therefore, the research question regarding how the dynamic capability perspective can evolve to understand digital transformation better, and the impacts of these capabilities on the phenomenon of digital transformation, were analysed afterwards (Figure 3-6). This section presents the data analysis process of this research.

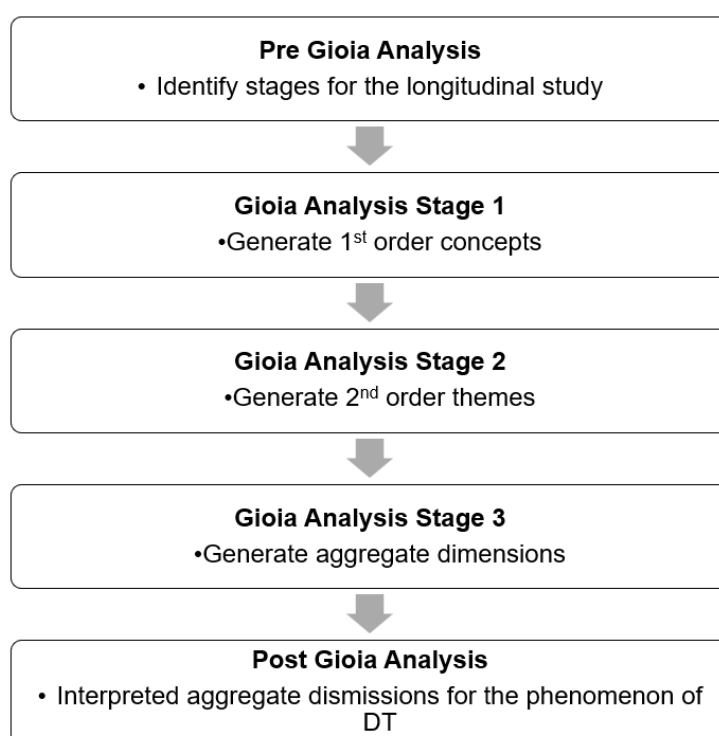


Figure 3-6 Data analysis process

Overall, the data analysis was conducted during the data collection process and provided feedback for the following data collection steps. For instance, more questions came up during the data analysis about how the management interpreted the tension created by introducing the digital incubator,

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and therefore, follow-up interviews with key people were arranged to understand their perspective. As a result, I found that while the top management were trying hard to support the incubator, the executives could not manage it alongside their daily routines and balance it with their key performance indicators (KPIs) driven by sales. Similarly, the customer data platform (CDP) project, introduced with very high priority by the top management, struggled to be successfully delivered according to the timelines. Benefiting from such a simultaneous and iterative process of data collection and analysis, more detailed and nuanced data were collected and analysed to add richness to the data of the research.

Due to the explorative nature of the research, and the lengthy nature of unstructured and semi-structured interviews, the data analysis was very time-consuming (Kallio *et al.*, 2016; Chauhan, 2022), especially for the first one to two years in this case. I immersed myself in the enormous amount of data, trying to make sense of the data regarding how Company Z developed and applied dynamic capabilities to address the digital transformation (Gioia, Corley and Hamilton, 2013). In particular, I coded external changes (the antecedents of dynamic capabilities), dynamic capabilities (sensing, seizing, and transforming capabilities), and the results of their digital transformations at the time. From numerous digital changes in the business environment, I finally identified an iterative process as an overarching pattern for the development process of dynamic capability. Figure 3-7 demonstrates the iterative process in the form of a spiral, where the case company sensed a particular external digital change, and responded to it by seizing. In the circles of the spiral, transforming was sometimes involved, but sometimes not, especially in the early stages of Company Z's digital journey. The paradigm presented as an upward spiral, where the dynamic capabilities developed more strongly while going up. More precisely, there were also many incidences of going forward and backward to enhance the capabilities that limited their development.

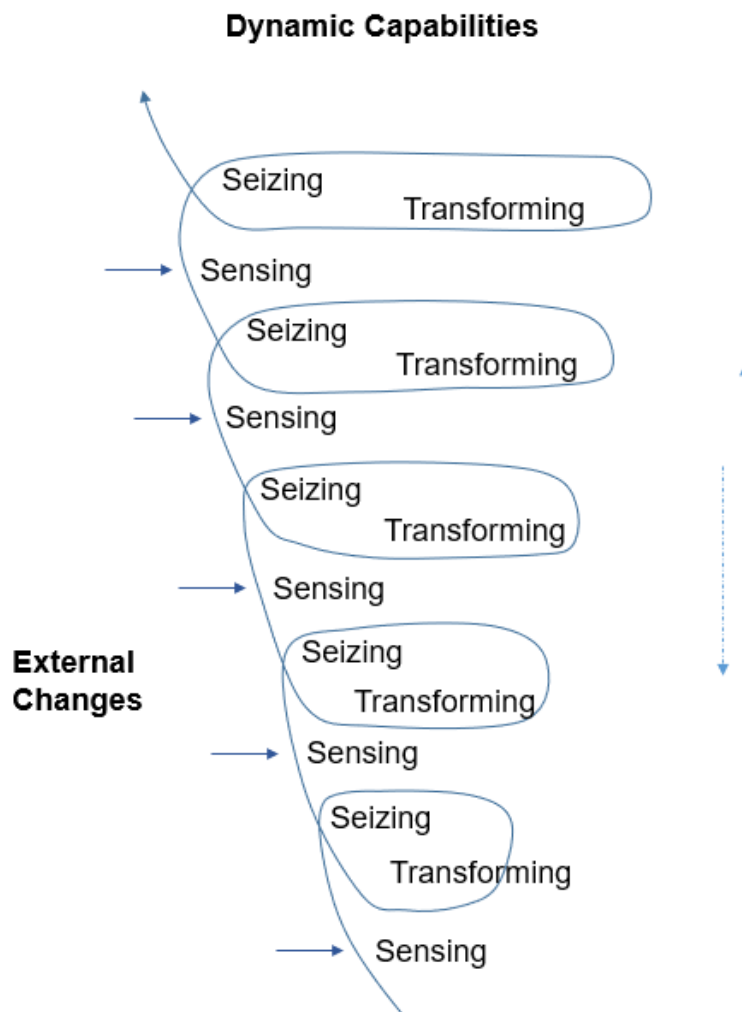


Figure 3-7 Spiral rise paradigm of the dynamic capability development

At the end of the first round of data analysis, when the real-time data had been collected and analysed for over a year, I was able to see the bigger picture longitudinally for the digital journey of Company Z. To identify the strategic stages without being lost in the numerous iterative sensing, seizing, and transforming circles from the initial data analysis stage, I interviewed the key leaders of the digital transformation project at Company Z to get their perspectives about the significant digital changes. As a result, based on the impact on their digital journey, four key strategic stages were identified: (1) the ubiquity of e-commerce, (2) the substantial digital disruption, (3) technology innovation, and (4) digital optimisation. Later on, the COVID-19 lockdown initiated the fifth stage.

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This provided milestones that allowed the 2010–2021 period to be divided into five identifiable stages, facilitating the second round of data analysis to become finer and more effective. In the second round, sensing, seizing, and transforming were coded for each stage using NVivo 12, demonstrating how the company tried to address external changes. Following Gioia's methodology for rigorous inductive research (Gioia, Corley and Hamilton, 2013), the first order concepts of the three clusters of dynamic capabilities were derived from participants' perspectives in their language; based on their similarities and differences, the first order concepts were then categorised into the second order themes from my perspective in academic language; the second order themes were then gathered into the aggregated dimensions, which were the three clusters of dynamic capabilities. Figure 3-8 illustrates the data structure of the data analysis for this research.

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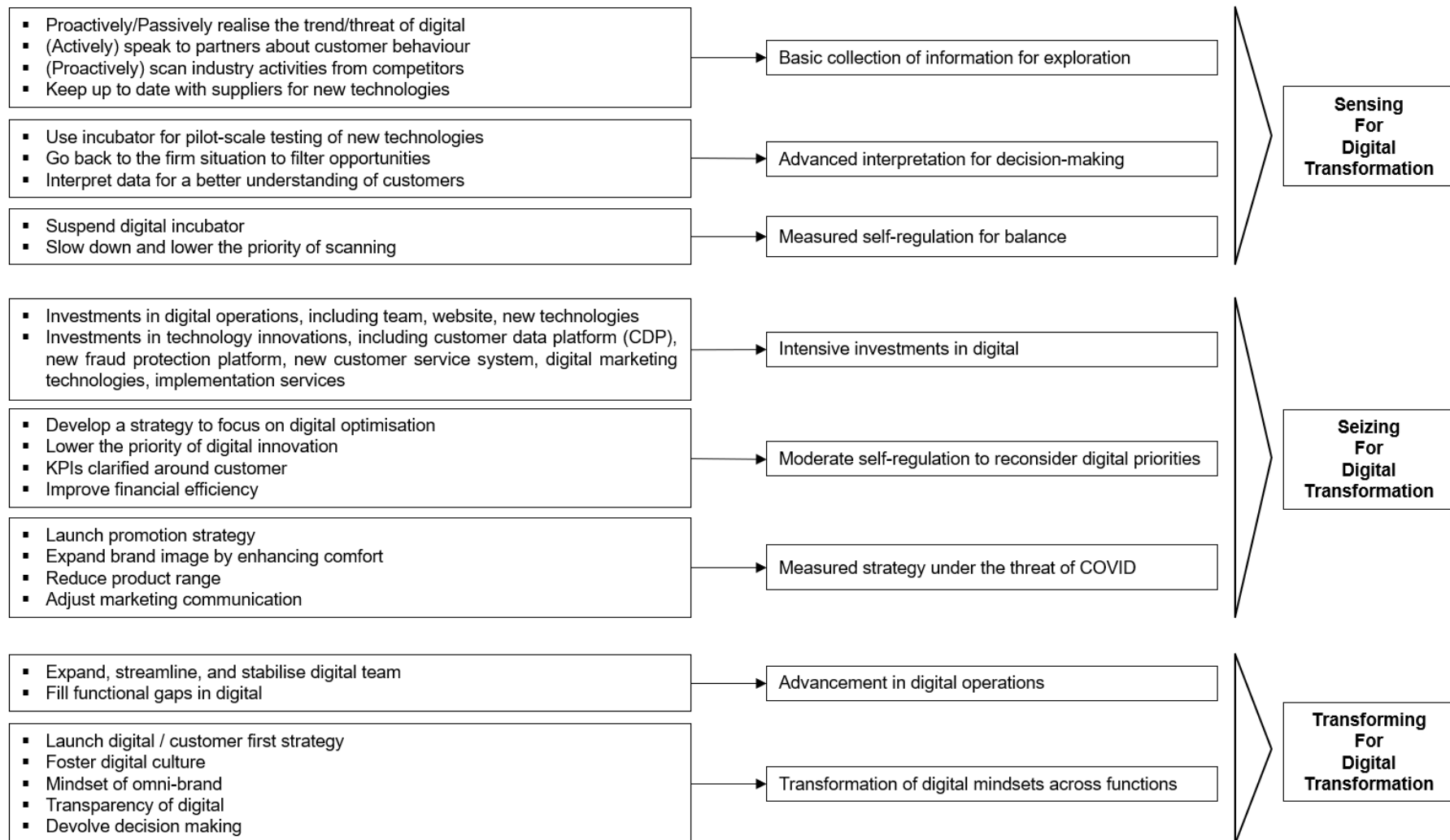


Figure 3-8 Data structure of the longitudinal research at Company Z

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There were ambiguities during the analysis. For example, the conventional conceptualisation is that reconfiguring is more about transforming or sometimes about seizing. Interestingly, from the data structure, this appears different in the context of digital transforming. One example is about building a digital incubator. The initial ambiguity was about whether to categorise it into seizing or transforming. However, further data collection revealed that the main purpose of building a digital incubator was to sense and pilot-scale test new technologies. Considering that it was conceived for better sensing and filtering of new technology opportunities, which was neither seizing nor transforming, I categorised building a digital incubator into the sensing dimension. Although sensing does not normally manifest in allocating resources to create new functions in the conventional view, from this case, reconfiguration was involved for sensing due to the requirement of new resources for sensing in the digital technology context.

As suggested by Gioia, it is critical to question whether the second order themes that emerge can potentially explain the phenomenon – in this case, the digital transformation process – and answer the research question of how the dynamic capability perspective can evolve to better understand digital transformation. However, the typical way of grouping themes was based on cross-sectional categories. For instance, sensing can involve scanning, learning, and calibrating (Yeow, Soh and Hansen, 2018); digital seizing can involve rapid prototyping, balancing digital portfolios, and strategic agility (Warner and Wäger, 2019); and transforming can involve configuring assets, shaping culture, decentralizing, redesigning routines and structure, top management leadership skills renewal, and business model redesign (Teece, 2007, 2014; Teece, Peteraf and Leih, 2016). Such a conventional way of categorizing the first order concepts cannot capture and represent the dynamics of sensing, seizing, and transforming capabilities over time, and the advantage of doing a longitudinal case study cannot be fully realised in this manner of coding. Therefore, I tried many ways of coding, continually questioning whether the second order themes could demonstrate the phenomenon from a longitudinal perspective.

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Eventually, I achieved a way for the second order themes to demonstrate dynamic capabilities' dynamics over time, as shown in Figure 3-8. For instance, sensing was experienced from the basic collection of information to advanced interpretation of information, to measured self-regulation, which slowed down sensing. It is similar to seizing, which was relatively intensive in 2018, and then moved to be more moderate later on, before becoming very conservative in the face of COVID. Interestingly, both sensing and seizing showed not only their aggressive aspects, but also their conservative aspects. This is critical to understanding the development of dynamics over time.

In the third round of data analysis, post-Gioia analysis was conducted, and in particular, matching conditions between sensing, seizing, and transforming during the five stages were analysed. Building upon the analysis regarding the dynamics of the three clusters from the second round, I examined how sensing, seizing, and transforming capabilities existed concurrently and evolved simultaneously during the digital journey of Company Z. I found that since they evolved at different rates, mismatches between the three clusters of dynamic capabilities occurred. To demonstrate the longitudinal dynamics, I used the darkness of the shades to represent their relative strength over time. The dynamic matching conditions between sensing, seizing, and transforming over time are visualised in Figure 3-9. In particular, Figure 3-9 demonstrates their matches or mismatches during the eleven-year digital journey of Company Z using different shades to represent the relative strength of the three clusters. Based on their nature, the five stages were named (1) response, (2) realisation, (3) accelerating, (4) consolidating, and (5) aligning.

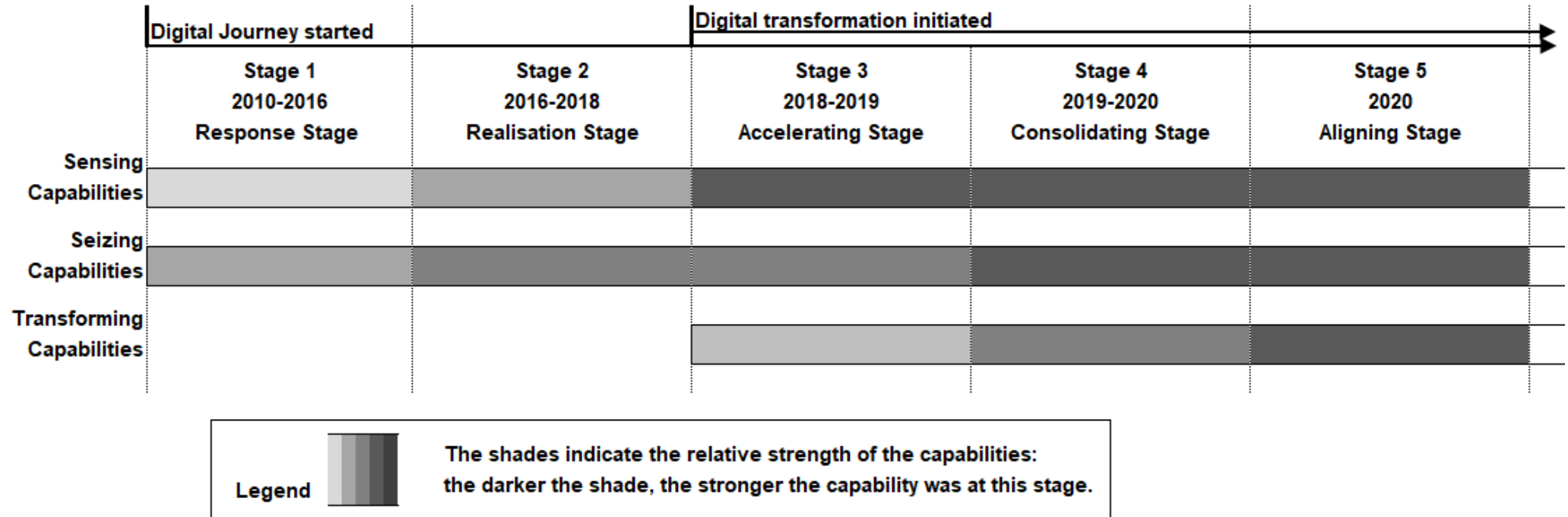


Figure 3-9 Visualisation of mismatches between sensing, seizing, and transforming at Company Z (2010-2021)

3.5 Findings

Stages	Digital Journey started		Digital transformation initiated		
	Stage 1: 2010-2016 Response Stage	Stage 2: 2016-2018 Realisation Stage	Stage 3: 2018-2019 Accelerating Stage	Stage 4: 2019-2020 Consolidating Stage	Stage 5: 2020-2021 Aligning Stage
Sensing Capabilities	No active sensing but realise trend of ecommerce	Realise the threat from digital disruption so sense actively - Speak to partners - Explore customer behaviour - Scan industry - Interpret as an opportunity	Further develop sensing for more opportunities: - Proactively scan competitors' activities - Keep up to date with marketing suppliers - Build Incubator - Invest in tools to understand market and customers - Explore new technologies available	Slow down sensing due to realising the risk of following too many possible technology innovations - Suspend digital incubator - Filter technology opportunities based on firm-specific situation	Operating sensing to understand external changes: - Realise the threat from the covid-19 lockdown - Scan the marketplace - Interpret data to understand customer
Seizing Capabilities	Follow the trend by investing in ecommerce - Build ecommerce team - Launch website globally - Launch mobile website - Leverage existing logistics and merchandising	Invest digital business to alleviate digital disruption - Re-platform with new technology - Build digital team with specialists	Invest in various technology innovations to seize opportunities - Customer data platform (CDP) - New fraud protection platform - New customer service system - Live chat for customer service - Digital marketing technologies - Implementation Services	Reinforce seizing by refocusing on digital optimisation - Strategy developed to focus on customer, brand and profitability - KPIs clarified around customer - Improve financial efficiency	Operating seizing to manage threat: - Launch promotion strategy - Expand brand image by enhancing comfort - Reduce product range - Adjust marketing communication
Transforming Capabilities			Initiate transforming to get through the difficulties: - Launch digital first - Foster digital culture - Expand digital team	Further develop transforming to support seizing - Devolve decision making - Streamline digital team - Stabilise digital team - Fill functional gaps	Carry on transforming to prepare for digital future: - Mindset of omni-brand - Transparency of digital - Customer first strategy
Coevolution of Dynamic Capabilities	<i>Due to weak sensing, seizing and transforming were not challenged.</i>	<i>Sensing and seizing were enhanced, but transforming did not follow up.</i>	<i>Seizing unable to match faster-developing sensing, initiating transforming to close the gap.</i>	<i>Moderated sensing, enhancing seizing and transforming to catch up.</i>	<i>Sensing, seizing, and transforming went toward alignment.</i>
Consequences for Digital Transformation	<i>Passive following (sensing as bottleneck)</i>	<i>Positive illusion (transforming as bottleneck)</i>	<i>Overinvestment (seizing as bottleneck, fundamentally bottlenecked by transforming)</i>	<i>Late awareness of transforming (fundamental bottleneck)</i>	
Catalysts for Digital Transformation					
Legend  The shades indicate the relative strength of the capabilities: the darker the shade, the stronger the capability was at this stage.					

Figure 3-10 Coevolution of sensing, seizing, and transforming at Company Z (2010-2021)

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Over the eleven years of engaging with online selling, Company Z's sensing, seizing, and transforming capabilities did not evolve in a linear, sequential manner (Figure 3-10). Each of the three clusters of capabilities evolved simultaneously and at different rates, generating mismatches between them. In this section, how these mismatches arose during the coevolution and their consequences for the implementation of digital transformation are presented.

3.5.1 Stage 1: Response Stage (2010-2016)

Company Z observed that its competitors and relevant benchmark fashion firms were building online businesses, selling directly to consumers. Despite lacking a clear vision for online commerce, Company Z decided to mimic competitors by investing in its own e-commerce platform. Considering that online trading did not fit into its business model, Company Z created a separate e-commerce team to avoid interrupting its existing business processes. This team was composed of 12 people, covering digital marketing, development, trading, email, and customer service.

The team leveraged some existing resources, such as logistics and merchandising. For example, Company Z extended its existing warehouse and delivery service in the UK for e-commerce. Company Z had extended the responsibilities of its existing merchandising department to manage forecasting and targeting for its wholesale customers business to the new online business. Staff from merchandising were transferred to e-commerce, and co-located with the e-commerce team. The new platform was launched and operated with all these resources.

We decided to move online by investing in the e-commerce platform. We launched the UK website in August 2010, rolling it out to the US and EU in 2012. Benefiting from the growth from launching the mobile website in 2013, optimisation for mobile devices was made in 2014. New Canadian and EU websites were launched in 2015, with the EU websites catering for three languages - German, Italian and French. – B7

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As a result, the growth of global digital sales was initially modest between 2010 and 2014 but stalled between 2014 and 2016 (Figure 3-11).

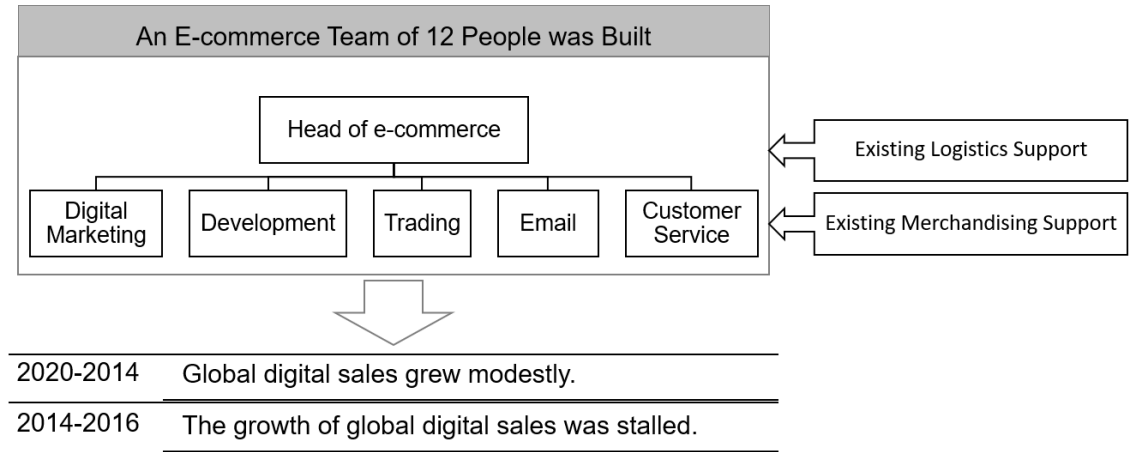


Figure 3-11 Snapshot 1 at stage 1: the establishment of e-commerce

3.5.1.1 Mismatch condition: weak sensing

In the early stages of e-commerce, the firm merely imitated competitors, with little planning for a large-scale expansion of its online business. Company Z built an e-commerce team, not because of active sensing, but because it did not wish to be left out; the majority of its competitors had started to do online trading. Without a clear vision, capability development for the first six years of trading online was therefore limited. Given that it was not actively scanning in stage 1, Company Z's sensing capabilities were passive. Thus, this stage is characterised as a response stage.

When I used to sit in management meetings, I would be almost ignored at the table. We were never really considered when we were doing photo shoots, buying and merchandising, where we sat in the office and the size of the team. We were sort of left as 'they sell stuff on the website' kind of mentality. – B6

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From the above quote, although e-commerce was built, it was poorly resourced compared to the wholesale department, which did wholesaling with distributors. As demonstrated in Figure 3-12, Company Z showed a strong preference for the wholesale department when allocating resources, since third party (retail) distribution was the business model of the firm. This shows the initial e-commerce mindset – ‘selling stuff on the website’, which was viewed just as an extra, secondary, channel for the business.

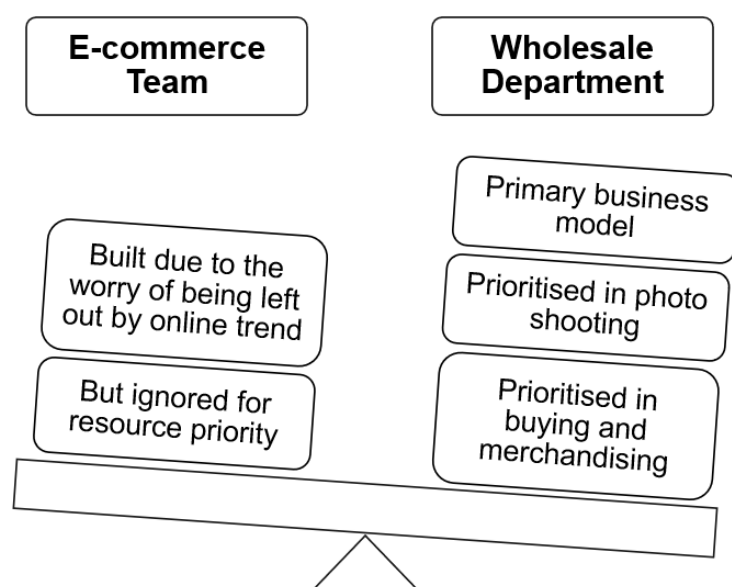


Figure 3-12 Snapshot 2 at stage 1: priorities in resource allocation

3.5.1.2 Consequence to DT: passive following (sensing as a bottleneck)

In stage 1, Company Z only sensed a fraction of the digitalisation picture. Thus, it had little sense of urgency and importance at this stage. The limited role of e-commerce opportunity sensed was within their seizing capabilities, so there was no need for further development of its dynamic capabilities. In other words, due to the relatively weak sensing, the strength of seizing capabilities was sufficient for the strength of sensing. As a result, seizing and transforming were not

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challenged, and thus, not developed (Figure 3-13). Therefore, sensing capabilities represent the bottleneck of dynamic capabilities at this stage, and their digital journey moved very slowly at this stage.

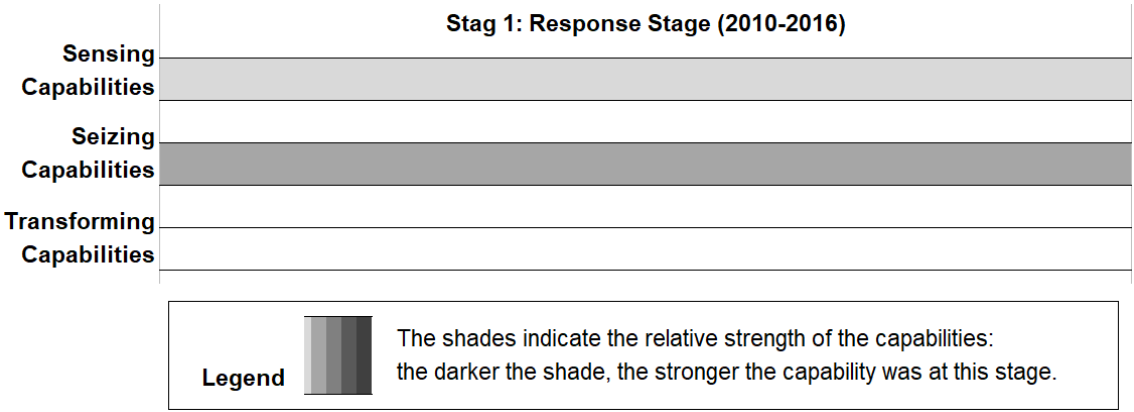


Figure 3-13 Mismatch condition at stage 1

3.5.2 Stage 2: Realisation Stage (2016-2018)

By 2016, the erosion of traditional retail channels' market share was accelerating. In communicating with its partners and bricks and mortar (B&M) retailers, Company Z understood more clearly the impact that digital disruption was going to have on its future. It noticed that new digital competitors were chipping away at traditional businesses, and understood that it could no longer secure a full range of its products on the shelf, deemed necessary for promoting in-store interest and brand building.

*... department stores closing, going into administration...
traditional retailing is having a tough time because of the online
retailers... our products got removed from the shelf. – B1*

Company Z realised that consumer behaviour had already changed enormously, with a considerable amount of time and money being spent on online shopping. It understood that this disruption would not be temporary, and that if it

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did not act, the situation would become untenable. Company Z's leaders realised they had to react to the change in consumers' channel choices and further develop their direct online sales by displaying a full range of products.

... (partners) have always bought the traditional Company Z shoes... It means that you're showing such a small portion of the range to consumers, and it just keeps us in our old buckets... digital enables us to put more products in front of consumers. – B4

Company Z could get access to customer data from third party partners and also lacked the capability to generate insights from e-commerce. It dawned upon managers that direct-to-consumer online selling could generate invaluable data leading to insights that might identify new opportunities. The prime motivation was to boost sales, generate consumer insight for the first time, and allow the company to offer a broader range of styles to appeal to more consumers.

We were a bit reliant on what the retailers and the distributors are telling us... we're not getting an indication of what the consumer actually wants. Our range is too big because of a lack of consumer insights. – B3

However, as the project progressed, Company Z saw the potential to generate customer insights and feed these insights back to the traditional business. Therefore, it perceived that digital transformation would be the way to be closer to customers and gain negotiating power with partners.

... online sales and insights, in turn, could feed into its negotiations over inventory and shelf space within its traditional channel, and so, could probably address the issue from traditional channels. – A2

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The e-commerce team investigated the reason why its online trading plateaued between 2014 and 2016, and felt that it was due to an aging trading platform which could not integrate with other data processing systems and was not flexible on different devices.

We wanted more flexibility... more mobile-friendly... a responsive website. – C5

To further develop online trading, Company Z invested in a more sophisticated online trading platform.

The re-platforming project was started in 2016, building the new website with updated technology and the mobile-friendly design. Mid 2017, the new platform went live. It was rewarded with a dramatic increase in global digital sales. – C5

A head of development was recruited to strengthen the capability to develop the new platform; specialists in trading analytics and customer experience were hired to exploit this new platform. Consequently, the limited e-commerce team morphed into a multi-functional digital team.

The team evolved from solely e-commerce to a multi-functional digital team as knowledge diversity was required to manage the new platform. Specialists in different areas were brought in to enhance the breadth of knowledge. For instance, a head of development was recruited to strengthen the development group; in the trading group, there were different specialists focusing on content, and numbers and metrics. New supporting functions were also built up: a member from the finance department was moved into the digital team to support digital finance analytics regarding budgets and forecasting; a customer experience arm was established, including user experience and user interface

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design; digital insights and optimisation function had been introduced for analysing data. – B4

Online sales doubled within a year following these investments (Figure 3-14).

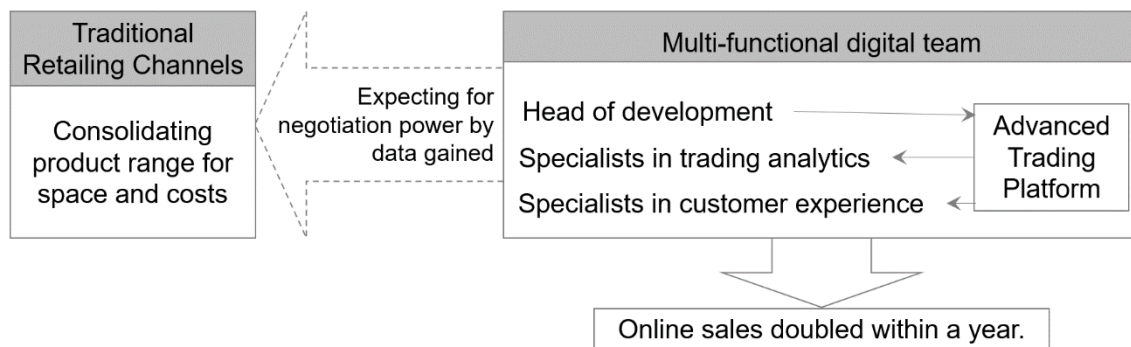


Figure 3-14 Snapshot at stage 2: response to the decline of traditional channels

3.5.2.1 Mismatch condition: transforming not follow the successful development of sensing and seizing

The realisation stage takes its name from the awareness of the threat of digital disruption and the interpretation of potential opportunities. This realisation indicates a more enhanced sensing capability compared to stage 1. The investment in technology and people overtly sought to improve Company Z's seizing capabilities. The new platform enjoyed initial success, creating the impression that digital transformation was succeeding. However, in meetings, the phrase "but we are wholesale" was commonly invoked as a plaintive cry from managers working in the larger, traditional part of the business. This demonstrates how the digital business was segregated from the traditional intermediated business and shows that transformation was yet to take place across the full business.

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Because the (digital) business has gotten so much bigger, we ended up creating a mini kind of world within the business. – B6

How they (digital team) share it with each other and how they share it with the wider groups is a problem. I do think sometimes we don't share enough. – B1

Therefore, while sensing and seizing were enhanced, transforming did not actually follow up (Figure 3-15).

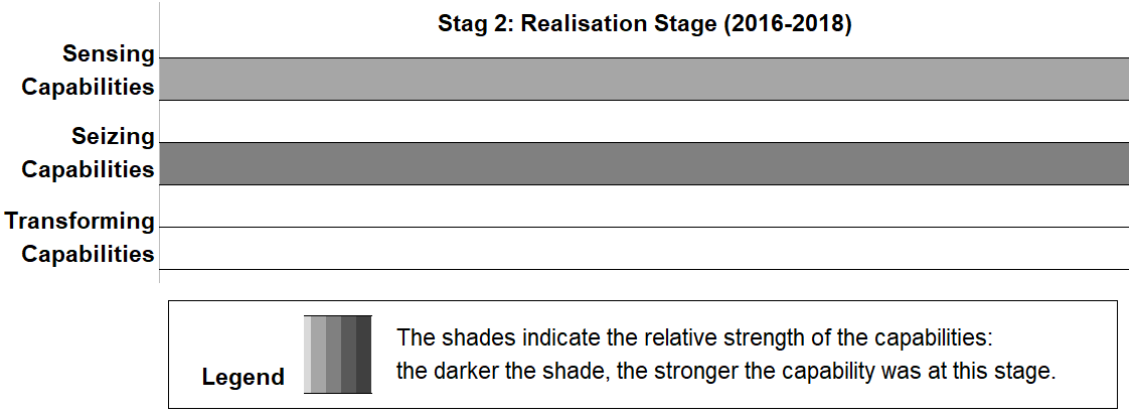


Figure 3-15 Mismatch condition at stage 2

3.5.2.2 Consequence to DT: false dawn (transforming as a bottleneck)

In stage 2, the pressure on the traditional business forced Company Z to realise the significant potential and the urgency of becoming digital. The initial digital investments generated returns with limited impact upon the resources and capabilities of the full business, and this masked the limited nature of its capability development. This initial success encouraged the business to accelerate its digital investments, expecting to scale up the initial success in the following stage. The limitations of its capabilities were not yet apparent.

3.5.3 Stage 3: Accelerating Stage (2018-2019)

Buoyed by its online success, Company Z accelerated its investment in online commerce. It actively scanned competitors' activities and kept up to date with marketing suppliers, and it was able to detect and invest in numerous technologies including those associated with website personalisation, integrated customer data platforms (CDP), fraud detection, customer service, and digital marketing.

From success of re-platforming (in stage 2), we expected digital business to grow significantly and play a crucial role for the business in the future. This encouraged us to continue catching up with peers' digital transformation. We proactively scanned the competitor activities and communicated regularly with marketing suppliers to keep up to date. We saw that leading companies in retailing were benefiting from innovative initiatives in digital. This motivated us to see the opportunity in new technologies. – B5

... costs of innovations were high, great returns were assumed in long term. With the aim of making future proof, big investments in innovation were made. The technology roadmap was developed accordingly, focusing on digital marketing, new technology and customer experience personalisation. – B4

... new customer service system, and website personalisation tool were invested in. Initiatives in operation was conducted, for example. click and collect. Live chat for customer service was implemented, website modifications were tested, the new platform for fraud protection was introduced, delivery to Switzerland was enabled for the Brexit trial, and 360 degree images on product description page were developed. More were explored in the technology roadmap, though not fully achieved, including mobile app development, and cutting-edge innovations such as artificial intelligence and augmented reality. – B4

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To conduct pilot-scale testing of new technologies, a “digital incubator” was launched to promote learning about customer behaviour and test alternative marketing mixes online. Its customer data grew exponentially, its ability to analyse that data was developed, and the influence of digital within the business increased.

We've got the incubator running. We're also entering into now a phase of looking at the customer, CRM and CDP, and how we can maximise all the data that we've been gathering. – B6

The business is relying on digital to pump the information back into the funnel... inform the rest of the business a lot more... makes the business stronger and more accurate in the products that they're designing and making. – B6

... making sure you're future-proofing your business: some things that are small now might be a big part of the program later... we are prepared for change. – A1

The incubator lab allowed new technologies and the costs associated with them to be tested on a small scale before rolling out to business as usual. – C17

The digital team moved quickly with these technology initiatives, which were mostly adaptations of ideas observed from other digital retailers and agencies. However, the scale and scope of the new investments proved difficult to manage, and the digital team soon lacked sufficient resources to extract value from all the investments.

Innovation is expensive... we've done lots of new things, then you go do that and then the team move on to that new thing. They forget about the things that they brought in. All those things require resources and tactical decision-making. So, you end up

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with having so many tools that you can't actually manage them, and then you're not getting the value from them. – A1

Since the digital incubator was run in addition to the daily tasks of the digital team, it even had to be temporarily suspended during the busy Christmas period.

We used it (incubator) for a few months this year, then we are so involved in trade and trying to focus on performance, so we couldn't focus as much as we did. – C4

The project (incubator) started with the digital marketing group testing new technologies to optimise return on advertising spend (ROAS). The incubator tasks were undertaken by the digital team in addition to our daily duties. It was a challenge for them, since their primary focus was on financial performance. – C16

The incubator had to be shut down for the fourth quarter in 2018, when we were too busy on daily trading. Its initial success led to a plan to relaunch the incubator with an intention of expanding its scope and creating a dedicated team. – C20

Another large, technology-led change was initiated in the upgrading of the firm's data warehousing and analytics capabilities. To maximise learning and responding to customers, the firm decided that it needed a single view of the customer across all activities, which could help it to co-ordinate all its marketing and sales to individual companies. As a result, the launch of an integrated customer data platform (CDP) represented one of the largest singular investments, but its full implementation was continuously delayed due to unresolvable resourcing issues.

We used to rely on a limited range of analytic tools, with aggregated sample level rather than individual customer journeys. For instance, the existing CRM system could only

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manage macro segmentation, and only behaviours after registration could be tracked, so we start to work on launching the CDP. This project would allow us to slice and dice our data. We would be able to understand all the touchpoints, optimise the whole customer journey and personalise communication messages through various channels. This project has been heavily invested. It is operated by the digital programme manager with the head of CRM's cooperation. – A2

The CDP project could remove the silos between different tools... Customer service used a specialised platform. Customer service had no access to the customer profile and order history. The interactions between customers and customer service group were also not recorded in CRM system. With CDP, the repository of customer data, all data would be captured into the same platform, and so could be accessed, shared, and analysed in digital team. – C8

... it (CDP) could improve the understanding of the contributions from different marketing channels... the affiliate marketing showed a good performance in ROAS, but there was an issue of attribution strategies. While the promotional partners contributed more to the conversion stage - the "last click" to fulfil purchase, the influencers and content partners contributed more to the upper funnel - raising the brand awareness. Since the previous platforms only allowed us to track the last click, the upper funnel partners had a higher commission rate to operate with. With CDP, a more accurate attribution model would be developed based on the tracked contributions of affiliate partners from the first to last click. – C14

The CDP project failed to deliver, and therefore limited the related initiatives, including optimising customer communications and personalising customer experience. – C9

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Other investments were being undertaken at the same time. The website personalisation tool and service implementer were implemented but underutilised. More cutting-edge innovations, such as AI and augmented reality, were still planned, despite the firm being overwhelmed by the investments already undertaken.

The (technology) roadmap are the high-level things that people find more interesting to talk about, but there's other stuff going on, which are less exciting, less shining... what I'm working on should have a more long-term view, but what happens now is a shorter view. You are just keeping on throwing yourself into the next thing every day. Today this is a priority, then the next day that is the priority. – C10

... but there weren't enough people and time to realise the benefits... website personalisation tool and service implementer were not fully used or explored. We built a digital insights and optimisation group, but data analytics stayed on an aggregated sample level, capabilities of generating digital insights and achieving digital optimisation were still absent. – C13

As a result, even though digital revenue doubled, the heavy investments reduced Company Z's profitability (Figure 3-16).

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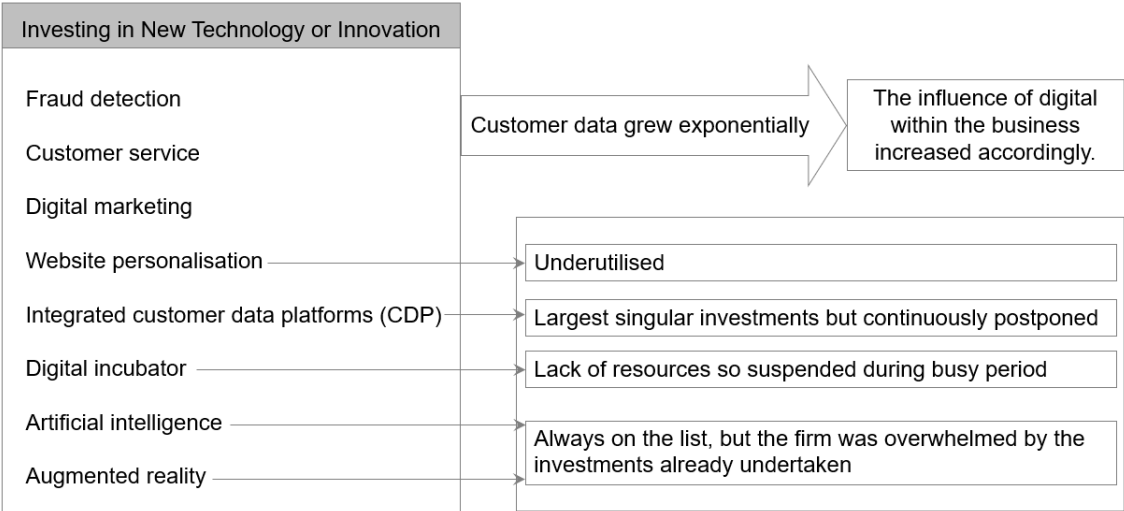


Figure 3-16 Snapshot 1 at stage 3: aggressive investment in new technologies

3.5.3.1 Seizing unable to match faster-developing sensing, initiating transforming to close the gap

The increasing awareness of technological opportunities and active scanning of the digital environment demonstrate the fast-developing sensing capabilities at Company Z during stage 3. In contrast, the tension of realising less value from the technologies in which it invested highlights that seizing capabilities lagged behind the faster-developing sensing capabilities. This mismatch spurred the firm to develop its transforming capabilities as a way of bridging this gap (Figure 3-17).

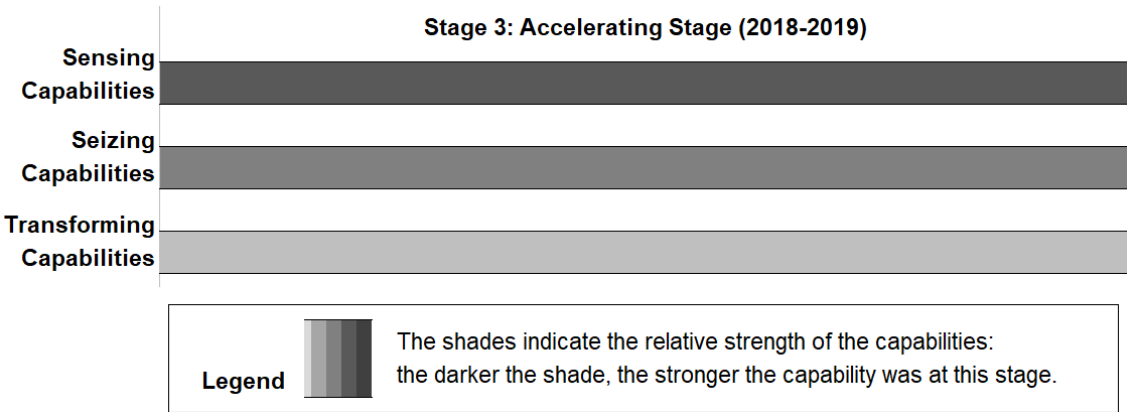


Figure 3-17 Mismatch condition at stage 3

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“Digital First” was launched across the company, aiming at both reallocating resources and initiating culture change. As part of the launch, the CEO moved out of his office to make room for the digital incubator, setting an example of the priority given to digital. This represents the beginning of “transforming”, the development of which would provide a solution for digital’s inability to “seize” the value in technologies “sensed”.

CEO also moved out of his office and let the digital team take it for digital innovation initiatives, demonstrating the priority he attached to the Digital First strategy. – B3

The frequency... interacting with other departments is increased... our demand on other departments is increased... we're becoming quite a resource absorbing department. We need 10 times as many pictures as we did... 10 times as much financial support... than we did a couple of years ago. Before... we have to shout very loud to get any attention... – B6

... with the introduction of Digital First... we're starting to take on more and moving forward with... We're now the first part of the business that anybody comes to for information... the first part of the business that is considered in any output from the business... for example, when marketing campaigns are being created by brand, they come to us for our requirements... previously, that wouldn't have happened. – B6

The e-commerce team, the predecessor of the digital team, were not really considered, for example, for marketing, buying, and merchandising. However, as the digital business grew, [the] digital team interacted with other departments frequently and became a resource absorbing team. The demand of the digital team on IT department, finance department and creative service team increased dramatically. The digital team had been much more prominent than before because of the Digital First strategy. – C18

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We also invest in the resources ourselves where the requirement is high. We funded a full-time contractor in the business intelligence team to serve the digital requests specifically in order to hasten the response time of data turnaround. – C21

Since all the departments, apart from digital, were established in a traditional business setting, their mindsets could not adapt to keep pace with the changes occurring during digital transformation.

It's part of the cultural change... (in) the business model being distribution and wholesale, they don't have to look at these reports on a daily basis... they've got two big orders a year for each season. When you move towards a digital business, we need to know what we're doing on a daily basis, on a weekly basis, that are two speeds in business. – B2

Everyone will try to be Digital First, but it's very different to put along the PowerPoint slide than actually do it. DT takes years and years rather than just being able to say you are now Digital First. I mean, we're not, we're still a wholesale company that really is trying to be digital, but it's not a seamless process. – C4

... they could be doing their job for 30 years... in their 50s... now they need to think about the digital world and how it works... it's a completely different world. DT as a company is a really big deal. – C1

Culture was a big challenge, since the majority of people had spent most of their career working with traditional wholesalers or retailers. It was never a simple shift for them to change their mindsets to adapt to the digital transformation. – C2

Company Z formed a Digital First group with its top management team (Global General Manager in Digital, Global IT Director, Global People Director,

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and Global Marketing Director), led by the Chief Operating Officer, to oversee the transformation. In addition to hiring people with digital marketing and sales experience, it trained staff, held presentations, and communicated extensively across the business to show the benefit of being digital.

... Digital First strategy was gestated and launched across the whole company. The Chief Operating Officer was the leader. – C3

That's a journey... helping those that don't understand what digital is about and why it's good for everyone... conversations that you had to have over and over and over... show benefits... impact... sales margin, customer feedback, all sorts of reasons... We have lots and lots of presentations where we tell people what we are doing... over time, people are more and more comfortable with digital. – A1

There were groups that needed persuasion. For example, wholesaler managers worried about their customer relationships if new products online competed with the traditional channel. They were being persuaded to use digitally enabled customer insights and product sales data to convince third-party distributors to incorporate the new products into their core range.

Digital is kind of like quite a lot mark down driving. Our wholesale customers are struggling with our markdown activities, because when you got smaller suppliers, they are not going to mark down their whole stock, and they are complaining like, oh, everyone can buy on the website 50% off, that's why they are not selling. – C7

The digital team expanded to over 50 people, becoming the biggest department in the company. New digital functions were introduced, including digital programme management, product delivery (referring to website feature implementation), and digital testing.

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The team have quadrupled in size ... the team have been diversifying their knowledge so the team have got a lot wider knowledge than they had. We are bringing in specialists to really boost the way that each of the areas function. – B6

A digital programme manager was recruited to oversee a series of projects that deliver strategic outcomes from the view of the entire business. – C11

A product delivery group (referring to website feature implementation) was developed with a product owner, a business analyst, and led by a head of digital delivery. – C6

A specialists focusing on A/B (bucket tests or split-run) testing and MVP (minimum viable product) testing were hired. – C15

*The customer service team had grown from 6 people to 22 people.
– C12*

Its office space doubled in size, with modifications made to the building to accommodate the growth.

“We used to have two meeting rooms here. We knocked down the walls to expand and put another bank of desks and brought in some new people.” – C4

Given the significant investments, great efforts in transformation, and growing size and influence of digital within the business, this stage is named the accelerating stage (Figure 3-18).

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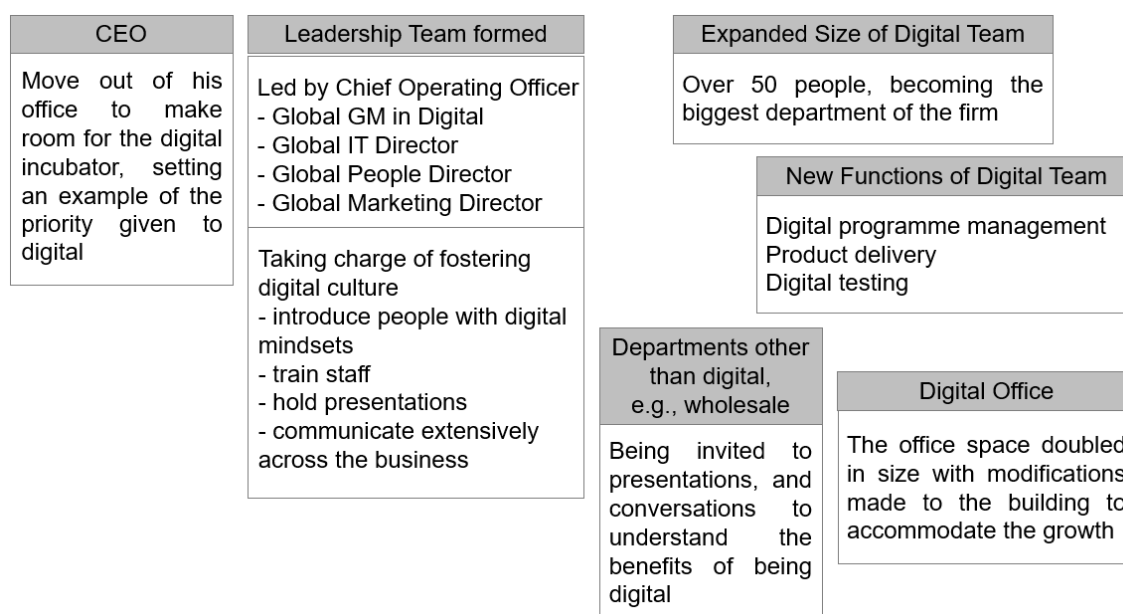


Figure 3-18 Snapshot 3 at stage 3: transforming

3.5.3.2 Consequence: Overinvestment (seizing as a bottleneck, fundamentally bottlenecked by transforming)

In stage 3, Company Z expected its digital business to grow significantly and play a crucial role for the business. The activities of sensing and seizing capabilities were accelerating, but seizing did not achieve the expected outcome from the intensive investments. In fact, more opportunities were sensed than could be successfully seized, and ambition outstripped the ability to seize. This highlighted the urgent need for transforming capabilities, which would, and later did, allow resource reconfiguration for digital and enhance support for developing seizing capabilities. It appears that transforming capabilities acted as a bottleneck for the other dynamic capabilities to perform at this stage.

3.5.4 Stage 4: Consolidating Stage (2019-2020)

The rapid expansion was costly and exceeded the capabilities of the emergent digital team. Costly, undelivered projects forced Company Z to review its digital

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strategy. Company Z realised that there were always more technological innovations emerging, and it could not implement everything that was sensed.

... innovation driving for building everything new... forget to stop still and think... what should I be driving? Lots of new things, but do we need them all now? Maybe we've grown too fast and too quickly and the fundamental model wasn't quite right. – A3

From a financial perspective, the digital business had seen a good top line growth, but majority of the profit was reinvested in innovation, so the actual profit was really low. – B2

A new general manager of digital was hired with a strategic focus on customers, brand, and profitability (Figure 3-19).

... what are you doing with investment... less about innovation, and more about optimisation. It's about the focus... once you got back to optimise a programme, then that's an always-on programme... it'll be part of your business as usual. – A4

Turnover is vanity, profit is sanity. We decided to focus on profitability. – A5

The digital business was overextended and hadn't got time to achieve optimisation as a foundation for digital transformation... refocused the investment from mainly in innovation to mainly in optimisation. – C22

Customer, brand and profitability were identified for digital optimisation. Five strategic objectives around them were developed - understanding customers, optimising customer experience, brand positioning, premium products, and profitability. – A5

... built up five sub-goals for each strategic objective and five tactical initiatives for each sub-goal. A five-pillar strategy, with five strategic objectives, 25 business goals, and 125 initiatives, were developed

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around the three fundamental areas. The five-pillar strategy was continually referred to as the principle of digital initiatives and the digital team were encouraged to make contributions for changing or updating the living document. – A4

A reduced number of KPIs were generated and these focused on customers. These replaced a very large number of reports into fine-grained details about each aspect of the Digital First strategy. This set up clear objectives and measures for the review of all the investments, which significantly reduced overall capital expenditure.

... over a thousand of reports ran on the digital system with too many KPIs, and many were missing the element of customer... so a list of 11 KPIs around customers were generated to guide the daily decision making. – A4

With the more tangible KPIs set, the digital team were aware of their responsibilities and also understood the principles of resources allocation. – A5

The digital GM ring-fenced a considerable part of the budget to prioritise spending on purely the top of the marketing funnel to support brand awareness and activation: the start of the sales funnel.

Although the premium brand strategy was agreed, it was not prioritised when it conflicted with the pursuit of revenue... promoting initiatives not aligned with brand strategy could potentially damage the brand image, and this in turn would affect the whole business...so I prioritised branding strategically in digital. – A4

Investments and costs were reviewed, and capital expenditure was reduced by 40%.

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The company was laden with costs in digital marketing, warehouse and distribution, and staff, being identified as the three big cost lines to be optimised... to be more profitable, we worked around contract renewals and driving costs down: investments without tangible return on investment (ROI) wouldn't go through...– A4

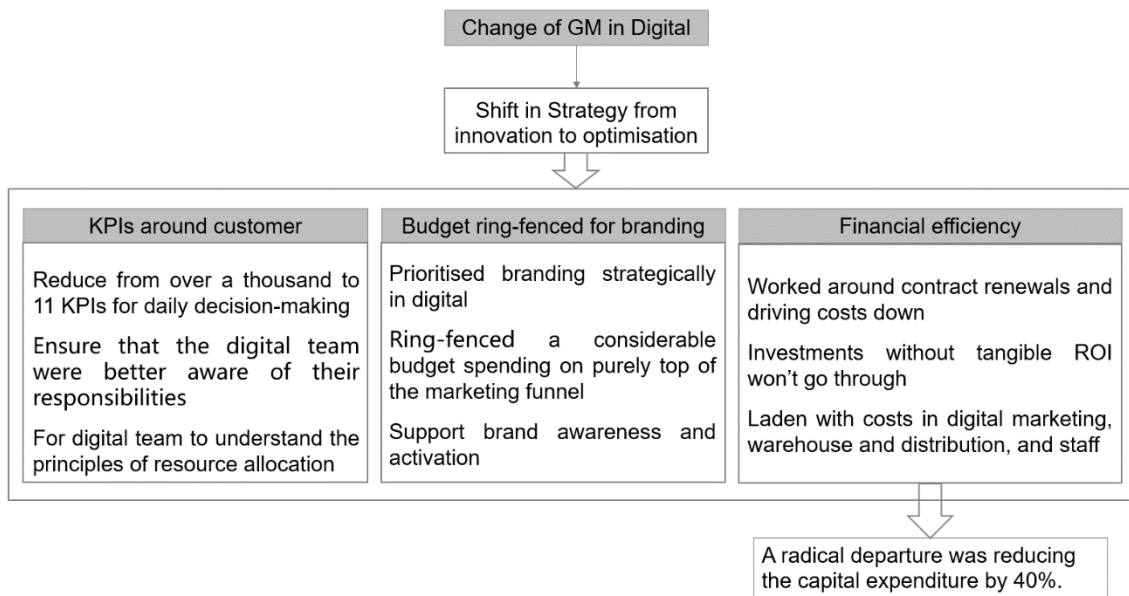


Figure 3-19 Snapshot 1 at stage 4: shift in strategy

The investment review led to a change in resource allocation. For instance, since the vast majority of the budget for the digital incubator was allocated to testing costly state-of-the-art digital marketing technologies, the incubator was suspended, citing its limited function and high resource requirements. In contrast, resources were maintained for the CDP which would allow Company Z to optimise the customer journey and personalise the customer experience, facilitate the removal of silos across different platforms, and improve the understanding of the contributions at each stage of the customer engagement process. This placed the investments in data in alignment with the new strategic focus, so appropriate resources were reallocated. In particular, an expert in

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customer experience was assigned to work hand-in-hand with the IT team to relaunch the CDP.

I don't think we have the right people looking at it (CDP)... It's been delayed by three months... unrealistic when we planned the project... it was ever going to be delivered in that time. We'll be using it... will add real value to the business... not only understand our customers more but also give them more relevant content. – A3

3.5.4.1 Moderated sensing, enhancing seizing and transforming to catch up

Company Z slowed down sensing more innovative technologies while enhancing their seizing capabilities by focusing on opportunities in optimisation ahead of innovation at this stage. After being bottlenecked by transforming in stage 3, Company Z realised the importance of transforming, so it carried on reinforcing transforming capabilities to facilitate the further development of sensing and seizing.

In particular, the new GM of digital encouraged more decentralised decision-making by providing the team with previously undisclosed business information and business goals.

... lots of decision avoidance and risk aversion, 'just do it' kind of mentality... like 'we don't have to make decisions – top management make all the calls'... Devolution has happened... the team are more in control... are exposed to all of the P&L [Profit and Loss]... I devolve decision making back into the teams for them to take ownership. – A5

The decision-making was devolved back to the heads... this reduced decision avoidance when the decisions were made from the top. The whole digital team were exposed to more business information with the clear view of KPIs and business goals to encourage all involving in decision making process. – A4

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The digital team was streamlined to assign clear roles and responsibilities.

We got rid of that director-level... made the structure slightly leaner, more accountable... – A5

The structure of the team was reviewed and adjusted according to the new optimisation strategy. The director level was removed, so the heads of each group in the digital team could report to the digital GM directly. People in the digital team who were not in line with the strategy left to move on with their careers... A leaner and more accountable structure was built up with the digital GM through heads to executives at the bottom. – A4

The digital team was stabilised and what was becoming an excessive reliance on third-party contractors was reduced.

We used to be heavily reliant on temporary staff and contractors to build the digital capabilities on a fast-track basis... this indicated premium payment for the service acquisition and an unstable digital team... a stable and proper team with more permanent employees was built. – A4

The digital team was more consolidated, efficient and collaborative with clear roles and responsibilities. – A5

In-sourcing was introduced to fill positions such as customer insights, which would be critical to sustaining their digital journey.

We only had one person dealing with customer insights, so we brought in someone who had the experience... build up our BI and overall insights across key areas to understand the customer. – A4

Function gaps were identified... customer insight was only managed by one contractor and this capability was not really built up... organic marketing was not paid attention to and the connection

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with branding and content creation was absent... conversion rate optimisation or multivariate testing programme was not properly in place... CRM was weak and their collaboration with other teams were not enough. – C1

... new people were recruited to develop the capabilities and fill the gaps in digital... a new head of insights was recruited to knit all data together... gain customer insights and build better forecasting. – C9

In summary, the transforming capabilities were strengthened by devolving decision-making, streamlining and stabilising the digital team, and filling functional gaps (Figure 3-20).

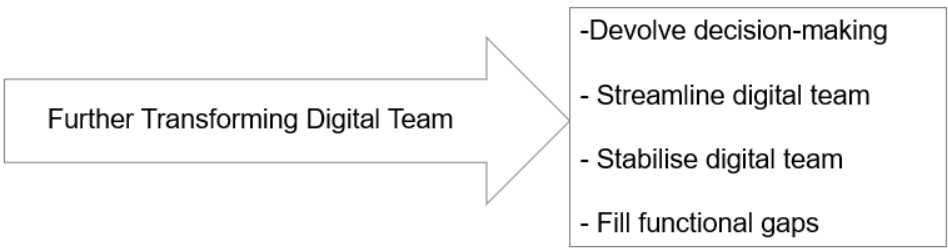


Figure 3-20 Snapshot 2 stage 4: transforming.

As a result, the growth of sensing was moderated whilst seizing, and transforming capabilities were strengthened: thus, this stage is named consolidating (Figure 3-21).

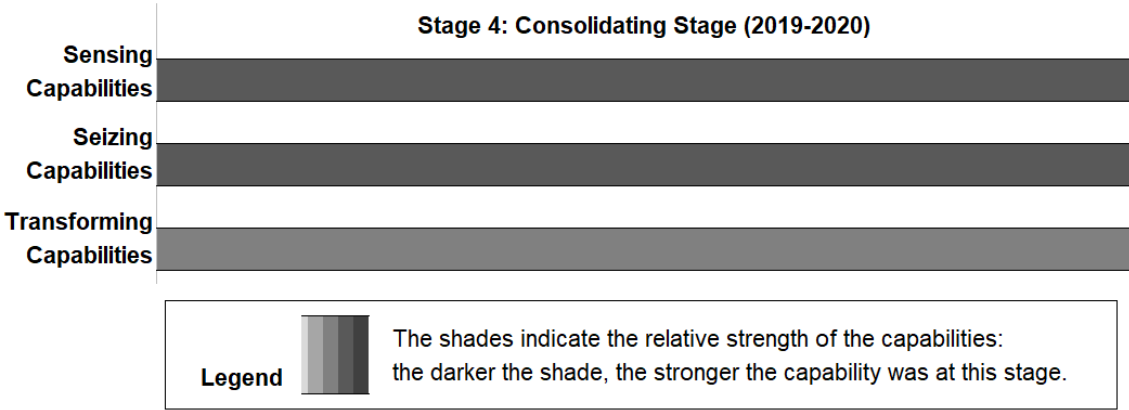


Figure 3-21 Mismatch condition at stage 4

3.5.4.2 Consequence: Late awareness of transforming (fundamental bottleneck)

In the early stages of its digital journey, Company Z was unable to grasp the extent of the task. When managers saw increased online sales, they thought they had already digitally transformed, but in fact, they had only succeeded in seizing the low-hanging fruit. True transforming did not begin until they were already restrained by it. Once they had become aware of the constraints, transforming became a continuous feature of their digital journey. Had it embraced the nature of transforming earlier, the company would have been better prepared, both mentally and operationally. This could have facilitated the acceleration of the digital journey by preventing transforming capabilities from acting as a bottleneck.

3.5.5 Stage 5: Aligning Stage (2020-2021)

COVID-19 accelerated a looming transformation of footwear retail towards online shopping. Company Z sensed a reduction in customer demand from online data, frequently scanned competitors' activities and industrial trends, and planned contingencies for various possible scenarios. Transforming capabilities, developed in the previous stage – particularly the devolved decision-making process – allowed the team to make strategic and tactical decisions efficiently in the face of rapid changes.

... really impacted consumer demand... our sales crashed... we've been tracking the marketplace... probably the most aggressive I've ever seen... our new strategy of premium positioning and less discount, we almost had to rip that up overnight... that stabilised us quite quickly. – A3

We saw the first blip in the digital numbers the night when the government stated that the situation of COVID-19 in the UK moving to the second stage. Not soon after, the digital business experienced a sharp dip as big as 50%. The digital team saw the

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consumer demand changed fast. Meanwhile, there was also an approximately 50% reduction in wholesale order books. – A4

As a result, the digital business responded to COVID by focusing on promotion for immediate revenue generation to ensure survival.

We adjusted our promotional stance at the first blip in order to drive demand. We employed a more aggressive discount strategy and pulled forward promotional events. We had been tracking the marketplace, which was much more aggressive, so we continued their promotion strategy. – A5

“Due to the previous full price premium strategy, customers weren’t worn out already when we did go into sales. After a short time of dropping off, the new promotion plan started to increase sales. – A4

Company Z also sensed an opportunity from the change in consumer lifestyles’ during the pandemic and seized this opportunity by leveraging the brand’s comfort heritage to support the more casual dress of lockdown.

We saw an opportunity to create a brand-new category called ‘home comfort’... suddenly everyone is home all the time, thinking, ‘Well, I want to be comfortable at home’... so search demand for slippers went up. – A5

We changed our marketing stance, since customers were at home all the time and wanted to be comfortable during the lockdown... aware of the change of customer situation, we saw massive surges in demand on slippers rather than seasonal items from the digital insights. – B3

As comfort from biomechanical technology was the key differentiator of their product, we successfully launched a brand new

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category called 'home comfort', followed by 'outdoor comfort', since customers walked outside a lot or did other exercise to get fresh air after the long staycation. – C8

Company Z tried to keep a minimum range of products to reduce the financial pressure.

We managed the factories to make sure that they dealt with the drop in purchase orders... We tried to forecast as much as they could and adjust their financial plans by extending payment terms proactively... the stock pool was analysed to develop new plans of turning them into cash. – A4

To generate as many sales as possible at lower costs, Company Z optimised its marketing communication.

... push brand messages about comfort... deliver relevant content through their marketing channels... talk more about staycation and being comfortable... move our marketing spend to the lower marketing funnel... rely more on our own customer base from CRM. – A4

In mid-August 2020, less than five months after the first COVID-19 lockdown in the UK, Company Z was confident about its position and returned to its brand-building posture, with less emphasis on pure promotion. The digital business was only slightly down on the year from a financial perspective but outperformed the average industry performance during the pandemic. (Figure 3-22)

... optimisation embedded into digital from last year, we are not laden with expenses... the team take ownership of decision-making, different from avoiding decisions or deferring decisions or becoming risk-averse last year... so we were very reactive, very agile, made

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the right call straightaway... helps us make sure it wasn't as bad as it could have been. – A3

We focused on optimisation at the start of the year, so in some respects, we were in a good place: therefore, we've been able to weather the worst hits of it. We are still working really hard on all our business planning and dealing with a drop in demand. We've been focusing on financial stability, and we are now starting to really lift our heads up and look to the future. – A5



Figure 3-22 Snapshot 1 at stage 5: manage the threat of the COVID lockdown

3.5.5.1 Sensing, seizing, and transforming moved toward alignment

The observation that sensing and seizing capabilities were able to perform to address the threat indicates that transforming did not perform as bottleneck capabilities at this stage. This is evidence of an emerging alignment stage (Figure 3-23). In stage 5, Company Z carried on transforming by integrating digital back into the business and building a collaborative culture in digital across departments.

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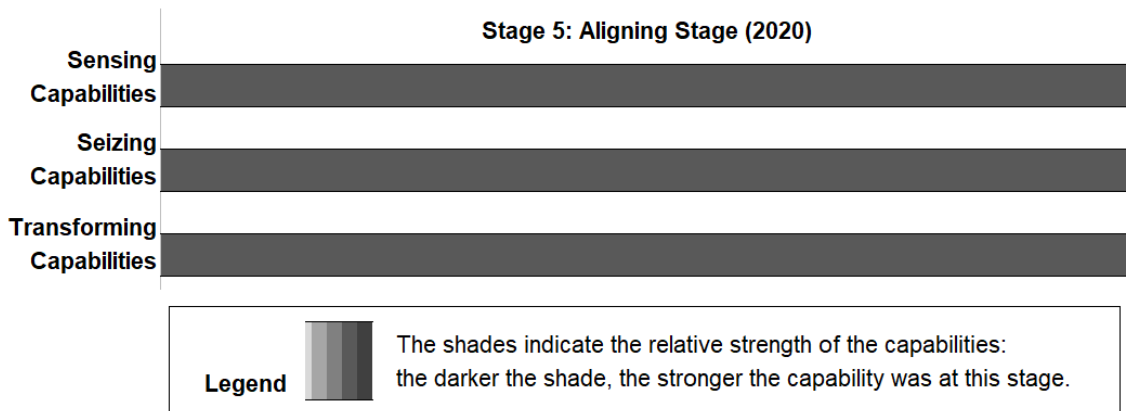


Figure 3-23 Match condition at stage 5

Since the business was reliant on digital sales during the pandemic, it provided an opportunity to progress the digital integration to the whole business. Additionally, the digital GM temporarily took charge of the brand and marketing department during the lockdown. This also created an advantageous situation for digital integration and collaboration.

There's so much noise in the rest of the business saying, 'we got issues here, we've got issues there', you know, digital was like the problem child... what I've tried to do is kind of say, we're not the problem child, we're actually a solution here. We can help the business overall if we do it all together. So I kind of brought the problem child home and to start joining up with the rest of the business. – A3

There is evidence that in this alignment phase, there was greater collaboration on digital transformation across the company. On the one hand, there were issues regarding the prices across channels, and conflicts, such as between digital promotions and brand image. Having been shown the critical role they now played within the business, the digital team learnt to support the brand image and be increasingly transparent. Since the digital transformation required support from the whole company, “Digital First” was rephrased as “Customer

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First”, ensuring that all departments felt included in the digital journey (Figure 3-24).

“What happened before was, after digital went on promotion, the brand team went ‘right... you’ll destroy our brand’... I want to drive the trade, but also understand that we’re a brand, we’re the biggest brand ambassador, and we need to ensure that we’re not trashing the brand... if our brand awareness goes down, then overall, it gets harder to get the right quality of traffic to the site. So that’s the kind of changing culture that we’ve been working on... I also took a decision to ring-fence some of the digital marketing spend to purely top of funnel, brands, activation pieces. – A4

I didn’t feel that we were joined up... we need to break these silos, so we need digital team talking to the brand team to IT as well as they should do... a culture training piece, ensuring that everyone from the CEO downwards is digitally native... we’re now having a regular weekly leadership meeting... I keep transparency to other departments about what digital is doing. – A5

Digital-first is not the digital team’s responsibility. That’s where the mistake that we made in talking about Digital First strategy when you got a digital team. The Digital-first mentality isn’t just a digital team. That’s a misconception: Digital First is for the whole business, actually, we changed that to Customer First, because that’s more rounded. – A3

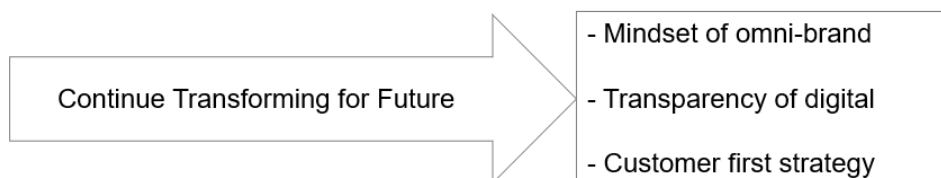


Figure 3-24 Snapshot 2 at stage 5: transforming

3.5.6 Conclusions of Findings

In summary, during the digital journey of Company Z, sensing, seizing, and transforming capabilities existed concurrently and evolved simultaneously. Since they evolved at different rates, mismatches between the three clusters of dynamic capabilities occurred. These mismatches manifested in the form of pitfalls for digital transformation, namely passive following (sensing as a bottleneck) at stage 1, the false dawn (transforming as a bottleneck) at stage 2, overinvestment (seizing as a bottleneck, fundamentally bottlenecked by transforming) at stage 3, and late awareness of transforming (fundamental bottleneck) at stage 4 in Company Z. The mismatches between sensing, seizing, and transforming capabilities created bottlenecks, restraining the progress of digital transformation.

These mismatches were both bottlenecks and catalysts of digital transformation, as they highlighted underdeveloped dynamic capabilities that were required to move forward. This is particularly evident in stage 3, when the development of transforming capabilities was spurred by great tension, with the company effort being unfocused, creating increased sales but lower profit. Fundamentally, the occurrence of mismatches provides an incentive for dynamic capabilities to develop. From this point of view, it is unsurprising that, in the case of Company Z, tensions occurred from mismatches during the accelerating stage, since dynamic capabilities were stretched by the demands placed upon them. When one cluster of dynamic capabilities leapt forward, the others were motivated to catch up, presenting signposts or even milestones for the company's digital journey. As observed in the Company Z case, instead of trying to avoid these mismatches, the progress of digital transformation was facilitated by successfully managing them.

Company Z's digital journey was an evolutionary path from some initial successes, following which the business stalled in stage 1, and advanced further in stage 2, and then progressed to a point where it hit a roadblock in stage 3, it used a different approach to progress in stage 4, and finally developed an awareness that it needed to balance sensing, seizing and transforming, and was successfully doing this in stage 5. This evolutionary path, which has benefited the

company during its digital transformation, illustrates how management leverage and direct the three clusters of dynamic capabilities, especially when they are stuck. For instance, at one point in Stage 3, it seemed to be wasting money, and there were disputes in the board. This was an inflection point that needed to be addressed, or a speed bump that ensured that process slowed down. This was neither a straight-line evolutionary path nor an automatic evolutionary process. Clearly, the coevolution did not happen on its own. There was a group of people orchestrating it, responding to roadblocks and bumps in the road, and those roadblocks or bumps forced them to achieve orchestration.

3.6 Theoretical Contributions and Managerial Implications

3.6.1 Contribution to the Dynamic Capabilities Literature: Coevolution of Sensing, Seizing, and Transforming

Firstly, the findings of this research challenge the conventional implicit assumption of a smooth and often sequential transition between sensing, seizing, and transforming (Gebauer, 2011; Helfat and Peteraf, 2015; Teece, 2018a; Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019). The findings suggest that the orchestration dynamics (matches and mismatches) of sensing, seizing, and transforming over time are critical for dynamic capabilities to evolve. Instead of looking for a fixed and linear sequence, I argue that the coevolution of sensing, seizing, and transforming is a managerial responsibility. This empirical study, therefore, provides a nuanced understanding with regard to the coevolution of sensing, seizing, and transforming capabilities and develops an evolutionary framework of dynamic capabilities based on longitudinal evidence. It also highlights the need to further develop the framework of sensing, seizing, and transforming.

Secondly, the findings of this research provide empirical evidence for the interdependency between sensing, seizing, and transforming capabilities. Different from the complementary relationship suggested by literature (Roberts and Grover, 2012a, 2012b; Birkinshaw, Zimmermann and Raisch, 2016), the

interdependent relationship places a sufficient sense of urgency on the fact that one capability's evolution depends on the others. In addition to a complementary relationship, interdependency between dynamic capabilities means that sensing, seizing, and transforming do not only evolve concurrently, but actually, more precisely, they coevolve over time. The interdependency manifests itself when one cluster of dynamic capabilities evolves at different rates compared to the others, creating a bottleneck and a stimulus at the same time. More specifically, on the one hand, when one cluster of dynamic capabilities evolves more slowly, it can act as a bottleneck for the others, and on the other hand, the faster-developing cluster of dynamic capabilities can stimulate the others to develop in order to match up.

3.6.2 Contributing to the Digital Transformation Literature: Pitfalls and Catalysts

This study contributes to the digital transformation literature by providing a nuanced understanding of the difficulties and opportunities that can arise during digital transformation. Although there is a consensus that the dynamic capability perspective can provide a theoretical foundation for understanding digital transformation (Shamim *et al.*, 2019; Vial, 2019; Coreynen *et al.*, 2020), previous research (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019) has tended to focus on theorising successful digital transformation processes, idealising the complex reality into simpler process models. However, such models could hide pitfalls on the digital journey due to their theoretical simplification. Building upon studies theorising the digital transformation process (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019), this research has examined the complexity inherent in this process by studying the challenges of mismatches between sensing, seizing, and transforming capabilities during digital transformation. Details of what the pitfalls could be and how they might occur from the mismatches are demonstrated. Aside from the pitfalls identified, opportunities within this challenge are also observed in the form of mismatches acting as catalysts for digital transformation. This research therefore enriches the theory about the complexity of digital transformation.

3.6.3 Managerial Implications for Digital Transformation Practice

Digital transformation is a complex phenomenon. The findings of this research have managerial implications, with the potential to reduce the high failure rates of digital transformation in practice. It is argued that the manner in which incumbents manage the coevolution of dynamic capabilities, and their matching conditions over time, hold the key to successful digital transformation. In addition to the development of each cluster of dynamic capabilities, the dynamic orchestration of sensing, seizing, and transforming capabilities is necessary for success.

The development mechanism and the interplay of the three dynamic capability clusters revealed by this research provides an evolutionary approach to managing this challenge during the digital journey. Management may welcome well-defined roadmaps for digital transformation. However, the findings of this research suggest that such roadmaps are simplistic and mask the flexibility required to identify and invest in capabilities as they become bottlenecks and slow down digital transformation. An evolutionary approach to digital transformation might be less comfortable for managers seeking to codify or plan its deployment. The findings provide a practical perspective for emergent digital strategies regarding managing the matches between dynamic capabilities over time: in other words, they provide a flexible approach for emergent strategy (Mintzberg, 1994) development instead of the traditional sequential approach to digital transformation.

It is suggested that essentially, managers need to embrace that, during digital transformation, mismatches between the three clusters of dynamic capabilities keep happening; sensing, seizing, and transforming capabilities are not in an idealised sequential line. The study's findings suggest that orchestration and coevolution require conscious, goal-directed managerial decision-making. The tensions are paradoxical, as mismatches mean that dynamic capability clusters are in conflict, and meanwhile they actually may accelerate each other, so the appropriate orchestration can take place. Therefore, these underlying

tensions created by such mismatches need resolution to progress digital transformation.

Companies require managers who are disposed to manage such tensions. Digital transformation will be comprised by an approach that naively invests in technologies, hiring young “digitally-savvy” workers and hoping for the successful transformation. Firms must experience or even create tension in order to have breakthroughs and thus to evolve the capability. If there is no tension, there will be no evolution. If there is too much tension, the whole process breaks down. Success will only be achieved if there is right level of tension and managerial intervention to avoid the bottlenecks in the dynamic capabilities hindering transformation.

3.7 Further Research

3.7.1 Reasoning Assumptions

Further research exploring the fundamental mechanism of dynamic capability mismatches is required to deepen the understanding of this phenomenon. Two theoretical assumptions could be developed based on the limited data presented in this case study. First, it is observed that sensing, seizing, and transforming involved different extents of changes in the resource base at Company Z. Thus, the first theoretical assumption could be that: *the evolution of transforming naturally tends to involve more complexity than seizing capabilities, and the evolution of seizing naturally tends to involve more complexity than sensing capabilities*. This could be a reason why sensing, seizing, and transforming evolve at different rates. Second, it was also observed that transforming capabilities involved reconfiguring less-visible resources, including culture, decision-making processes and authority structure, collaboration and integration. These were unseen or unknown to incumbents at the earlier stages of their digital journey. Thus, there is a theoretical possibility that: *transforming capabilities naturally tend to start to develop later than sensing and seizing capabilities*.

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If these two assumptions are true, two mismatch issues are likely to occur. First, since sensing capabilities could evolve faster than seizing capabilities, there will probably be more opportunities sensed than can be seized. Second, since transforming capabilities could evolve later and more slowly, they are likely to be underdeveloped when seizing capabilities require their support. Hence, transforming capabilities would potentially limit the further evolution of seizing capabilities at some point. More research is required to validate the two assumptions developed and to understand whether the two described mismatch issues are typical in digital transformation practice. More case studies are also called for to explore the coevolution of dynamic capabilities in different companies, contexts, or industries during digital transformation. Longitudinal case studies examining a longer period can contribute to the understanding of coevolution after one alignment and how businesses can learn from direct or indirect coevolution experiences to be more efficient during digital transformation.

4 SUMMARY

The thesis challenges the dominant conceptualisation of dynamic capabilities, established by Teece, as a linear evolution between the three clusters: sensing, seizing, and transforming. From a literature perspective, I have argued that this has not been borne out through empirical research and remains, therefore, assumptive.

I suggest that Teece's three-part sequential model is more of a taxonomy or classification rather than a dynamic model of capability development. From the longitudinal data collection and analysis, I observed the evolution of the three clusters of dynamic capabilities, which challenges the sequential model. I then decided to build the case for the use of evolutionary theory. As a result, I built the argument that if the development of capabilities is evolutionary rather than necessarily sequential, there is a role for managerial agency in coordinating the three components. That is, management plays a role in orchestrating dynamic capabilities to navigate an evolutionary path for their digital transformation.

With this extended perspective on how dynamic capabilities evolve, the thesis described the findings of a three-year longitudinal study of an international shoe designer/manufacturer's digital transformation. I then talked about the most significant finding, regarding mismatches and blockages, and how management resolved each mismatch to continue on the transformation journey.

This thesis presented two papers – a literature review and an empirical study – to address the following research question:

How can the dynamic capability perspective evolve to better understand digital transformation?

Firstly, this study presented the findings for the research question, explaining the possible reasons hindering digital transformation from a dynamic capabilities perspective. Based on a longitudinal case study, the evolution of dynamic capability clusters throughout the digital transformation was explored, and it was found that sensing, seizing, and transforming, rather than being sequential, coexist and coevolve during digital transformation. When they evolve at different

speeds, mismatches can occur, acting as both bottlenecks slowing down the transformation and catalysts that improve underdeveloped capabilities. In particular, in this single case study, the pitfalls that hindered digital transformation included: a) passive following (sensing as a bottleneck), false dawn (transforming as a bottleneck), c) overinvestment (seizing as a bottleneck, fundamentally bottlenecked by transforming), and d) late awareness of transforming (fundamental bottleneck).

This research re-examined the conventional conceptualisation of dynamic capabilities in terms of sensing, seizing, and transforming in the rapidly changing digital context. To further our understanding of the dynamic nature of these clusters, this study revisited the theoretical underpinnings of dynamic capabilities: the evolutionary root. It thus extended the framework by introducing the evolutionary perspective to the framework of the three dynamic capability clusters, identifying the need to consciously orchestrating sensing, seizing, and transforming in order to match them up. While orchestration dynamics refer to their collaboration and interactions, the identification of orchestration dynamics releases the intended dynamic nature of sensing, seizing, and transforming capabilities, and this advancement of the framework can better serve the high-velocity digital context.

The empirical study illustrated the role of evolutionary and orchestration theories in the context of developing new dynamic capabilities, and hence contributes to theory and practice (Table 4-1). Firstly, this research offers insights for the reasons why digital transformation may experience significant challenges. Building upon previous research (Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019), which developed process models to theorise digital transformation from a dynamic capabilities perspective, this thesis unpacks the complexity of the phenomenon during the evolutionary process. Secondly, while extant literature tends to take a taxonomy approach to classify the three clusters of dynamic capabilities without examining their dynamic nature, it risks conveying a conceptualisation that potentially misses the essential dynamism of the underlying phenomenon. Building upon the conventional conceptualisation of

sensing, seizing, and transforming, this research advances this framework by releasing their intended dynamic nature as dynamic capabilities. Thirdly, the findings of this research suggest that management embraces or creates the right level of tension for dynamic capabilities to evolve for digital transformation. That is, managers need to consciously orchestrate the three clusters of dynamic capabilities to shape an evolutionary path that will benefit their digital transformation.

As presented in Table 4-1, in addition to the theoretical contributions and implications, and managerial implications, this thesis also has methodological implications for future research through its longitudinal research design (Pettigrew, 1990). Although there is a limited number of studies designed to collect data over a period of time in this research field regarding sensing, seizing, and transforming (e.g., Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019), their analysis is framed to classify the three clusters of dynamic capabilities without tracking the dynamics between them. In other words, fundamentally, these studies (e.g., Yeow, Soh and Hansen, 2018; Warner and Wäger, 2019) still apply an independent and static approach instead of a processual and emergent longitudinal perspective. As a result, the benefits of conducting a longitudinal study compared to a cross-sectional study are not realised and the framework itself in terms of the clusters' dynamic nature is not investigated from a longitudinal lens. Therefore, while extant studies applying this framework frame their analyses through classifying the three clusters without looking at their dynamic nature, the research design for developing the framework itself can be different from applying the framework. In order to further develop the framework, longitudinal studies designed to track the three clusters' dynamics over time and examine their evolution process are suggested. In conclusion, based on the evolutionary underpinning, there is a need for longitudinal research designs and a shift away from an isolated and serial view in order to further advance and validate the framework of sensing, seizing, and transforming by tracking how they may evolve regarding their dynamics over time.

	Re-Examining Dynamic Capabilities in the Context of Digital Transformation - Coevolution of Dynamic Capabilities during Digital Transformation
Theoretical Contribution to Digital Transformation Literature	<p>Provide a nuanced understanding of the pitfalls for digital transformation (mismatches of sensing, seizing, and transforming can act as bottlenecks, slowing down the transformation)</p> <ul style="list-style-type: none"> ▪ Passive following (sensing as a bottleneck) ▪ False dawn (transforming as a bottleneck) ▪ Overinvestment (seizing as a bottleneck, fundamentally bottlenecked by transforming) ▪ Late awareness of transforming (fundamental bottleneck) <p>Mismatches of sensing, seizing, and transforming can also act as catalysts that improve underdeveloped capabilities</p>
Theoretical Contribution to Dynamic Capability Perspective	<p>Observe the coevolution of sensing, seizing, and transforming</p> <ul style="list-style-type: none"> ▪ Dynamics (matches and mismatches) between sensing, seizing, and transforming during their coevolution ▪ Orchestration of the dynamics between sensing, seizing, and transforming over time indicates their interdependency during their coevolution
Theoretical or Methodological Implications	<p>Theoretical implications:</p> <ul style="list-style-type: none"> ▪ The complexity of digital transformation ▪ The complexity of the dynamic capability framework regarding sensing, seizing, and transforming
Managerial Implications	<p>Managerial implications:</p> <ul style="list-style-type: none"> ▪ Consciously orchestrating sensing, seizing, and transforming capabilities to achieve digital transformation ▪ Embrace the tensions created by the mismatches between the three dynamic capability clusters ▪ Create the right level of tension for dynamic capabilities to develop

Table 4-1 Overall contributions and implications of thesis

In terms of limitations and future research, firstly, this thesis has further developed the dynamic capability framework regarding sensing, seizing, and transforming capabilities by identifying two dimensions of their dynamic nature conceptually. Empirical studies are needed to validate this advanced conceptualisation of the framework and a longitudinal research design is suggested for future research in order to track its conceptualised dynamic nature over time. Secondly, this thesis conducted empirical research through a single longitudinal case study in the retail sector. While the context of the research is a limitation, future research is called for in the form of more longitudinal case studies examining the coevolution of dynamic capabilities over time in diverse industries and national contexts to further extend knowledge in this field. Thirdly, this research observed mismatches during the coevolution of dynamic capabilities. However, the fundamental reasons behind this observation remain unclear. Potential reasoning assumptions based on this single case study are discussed in this research, attempting to explain the fundamental mechanism of dynamic capability mismatches. Future empirical research is required to examine these assumptions in order to deepen the understanding of this phenomenon.

I did not think that I would have arrived at my theoretical contributions in the absence of hands-on involvement with a three-year longitudinal case study. I recall the first year or so of my PhD, reading widely but finding it hard to discern the central perspective in the context of digital transformation in the RBV/Dynamic Capabilities literature for my thesis. This was a case of my own thinking evolving with critical reflection on what I was observing in the company in parallel with ever more reading. I observed that there were intensive investments in digital transformation activities and high expectations from these investments. Meanwhile, management struggled to realise the potential to meet their expectations. In the case company, digital transformation is neither the hero visionary with clearer sight of the future, nor a committee with plans acting in a stable and predictable environment. The company has had to embark on a journey, keep looking for feedback, make big bets (digital incubator, Digital First), and change priorities quickly when necessary, but persevere. Digital

transformation is a long process, and is not guaranteed. Therefore, I could not see the pattern until I had stayed with the company for over a year. I learnt from the managers when there were shifts or big changes in their firm strategy. Nuggets of wisdom were learnt from the management about how they resolved their struggles when they could not realise the potential of their investments to meet their initial expectations. It took me a long time to immerse myself in the theory and data to find an effective way to navigate the research by leveraging the dynamic capabilities perspective. Benefiting from the intensive engagement with the case company, I finally made my breakthrough when I saw the iterative pattern of sensing, seizing, and transforming during the case company's digital journey. This was the moment when it started to come together, and an evolutionary pattern started to emerge from the data. I wish to publish my empirical work from this research after the submission of my thesis. I would like to look further into this area, and the orchestration of dynamic capabilities during their evolution for digital transformation could be the next anchor for my academic research. This PhD study has been a precious experience. It now sets up the beginning of my research career, and I am looking forward to progressing it in the near future.

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APPENDICES

Appendix A Company Z Case – The ‘Digital’ Journey

A.1 Background to Digital Transformation

Established in 2007, Company Z is a London-based shoe company that aims to produce a high-end product line combining both comfort and fashion. This would be achieved through both closely following fashion trends and the exploitation of biomechanical technology in the soles of the shoes.

Company Z entered the market initially as a sandal brand, using a distributor model whereby produce was sold through third party retailers and distributors rather than directly from the company. Company Z built its business globally in Asia Pacific (APAC), Europe, the Middle East and Africa (EMEA), the US and Canada. However, the distributor model made it difficult for Company Z to present newly developed products to consumers, since third party partners have a preference for traditional designs that are known to sell well. A consequence of having only the traditional product range put in front of consumers was that it restricted Company Z's ability to fully exploit existing customers (who may be interested in more than just traditional products) and acquire new customers (who may only be interested in new products).

A further problem with the distributor model lies in analytics. Because Company Z did not directly transact with the end customer, it could not gather data itself. Instead, it had to rely on data provided by the third party. Such data could be deficient in terms of quality and reliability, since it is filtered through the ability and bias of the third party. To quote *the Global Market Director at Company Z*: “Because if they don't give you sell-out data, then you're not getting in an indication of what the consumers actually want, you are hearing what they want to tell you”. The lack of customer insights generated through the deficient analytics was thought to be limiting the growth of the business.

The recent years in the retail sector have been described as a period of digital transformation where traditional methods of retail have experienced increasing

difficulty brought about by the advancement of online retail. With sales numbers of B&M retail declining, department stores closing down and businesses going into administration, retailers have shrunk their offline business and started to grow their online business. An example of how Company Z reacted to the changing situation can be seen in their involvement with Nordstrom. Here, Company Z shoes were previously sold in Nordstrom's physical store but have subsequently been moved to Nordstrom online only. This has the benefit of opening up Company Z's product range to the market; however, in this case, Company Z is taking most of the risk because it is a consignment model with drop shipping by Company Z, whereby the third-party retailer – in this case, Nordstrom – only pays for the product after it has been sold to the customers. Experiencing the shrinking of traditional retailing and observing the growth of online retailing, Company Z decided to adapt to the changing environment by starting its own digital journey. Its hypotheses were that online retailing will continue to grow, and that customer data accrued will provide customer insights that will further drive product selection and development. Sales data gathered online showing that Company Z is meeting customer needs may also be used to persuade third party retailers to place products in their B&M stores rather than only in their online space.

A.2 The Move Online

Company Z made its first move online with a UK website in August 2010, rolling it out to the US and EU in 2012. Websites optimised for mobile devices followed in 2013. 2014 saw a 44% growth in Company Z's US e-commerce and further developments were made to the mobile website. New Canadian and EU websites were launched in 2015, with the EU websites catering for three languages (German, Italian and French). During 2016, based on the user experience, Company Z started work on developing a new web platform, which was subsequently launched in 2017. In 2018, the Digital First business strategy was launched across the whole company, entailing the prioritisation of digital retail over third party distribution. Figure 0-1 presents these developments and milestones in a timeline, which can be divided into three distinct phases: the e-

commerce era (2010-2017), the Digital First era (2017-2019), and the emerging era (2019 onwards).

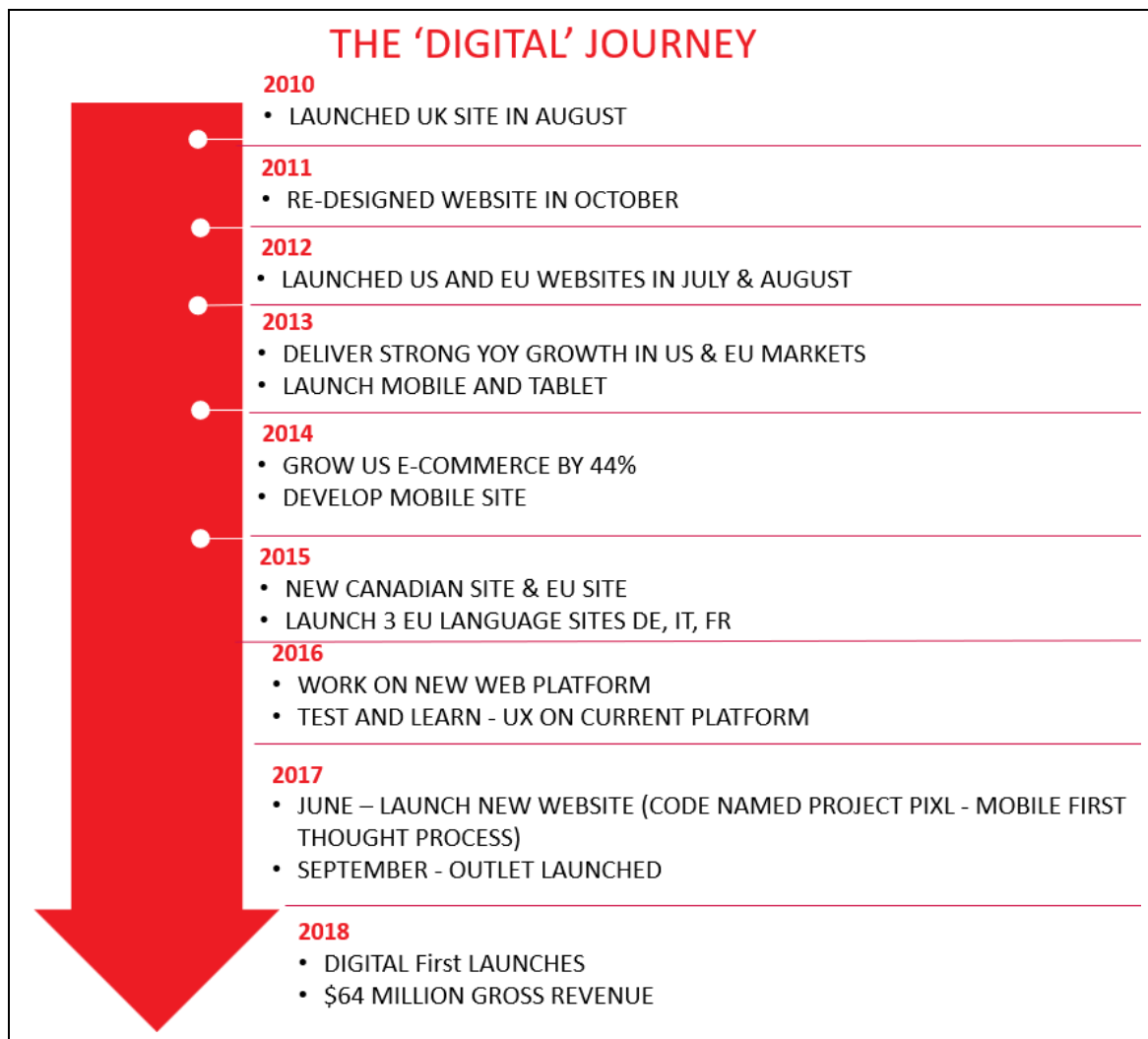


Figure 0-1 Timeline of Company Z's digital journey (Source: Company Z document – Intro to digital)

A.2.1 The E-commerce Era

With the increasing popularity of opening digital channels in the retail sector, the online team at Company Z was first established in 2010 for online trading. The main focus of the team was on the day-to-day trading on the website, aiming to sell more shoes. By 2014, this team had grown to be composed of about 12

people, covering the following areas: digital marketing, development, merchandising, trading, email, and customer service (Figure 0-2).

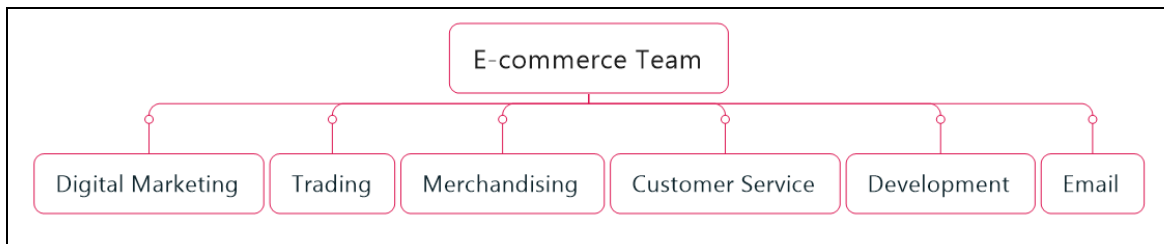


Figure 0-2 Org chart of the e-commerce team

“And we were focused on the here and now. So what do we need to do today, tomorrow, and you know, maybe into next week, to trade the business and sell more shoes. And that's kind of where we were for a couple of years” – Global Head of E-commerce.

For the first five years of e-commerce (from 2010 to 2014), the growth of online revenue was steady, although the total amount was relatively low. However, the revenue growth stalled between 2014 and 2016. This was attributed to the limitations of the platform. At this point, the trading website platform was ageing and did not satisfy the requirement of flexibility.

“We wanted more flexibility, for example, more mobile friendly, to have a responsive website” – Web Developer in Digital.

In 2016, the project of re-platforming the website began in order to resolve the limitations of the older platform. Building the new website and moving it to a more suitable platform with a mobile-friendly thought process represented a big investment. The new platform went live in mid-2017, and Company Z was rewarded with a dramatic increase in the global digital sales.

“Our business was fairly flat across 2014 and 2016. As you can see how big our lift was in 2017, and much of that since we launched the new site in the second half of the year. The performance of the platform has improved the online

shopping experience for our customers. We've already reached our 2021 targets"
– Global General Manager in Digital.

A.2.2 The Digital First Era

The Gestation and Launch of the Digital First Strategy

Company Z had experienced limited negotiating power, with sales partners dictating which products (usually from the traditional range) would be supplied. A lack of data prevented Company Z from showcasing the potential of their new product range. Such problems restricted Company Z's ability to develop their product range, attract new customers, and fully control their brand image in the competitive footwear industry. Furthermore, the traditional B&M retailers were experiencing great difficulties, and Company Z's products were being reduced in space or removed from shelves in stores.

"... the high street is kind of having a tough time of things. You know, you've got department stores closing, you've got people going into administration, and you know, the real kind of bricks and mortar, traditional retailing is having a tough time, because of the online retailers" – Global Marketing Director.

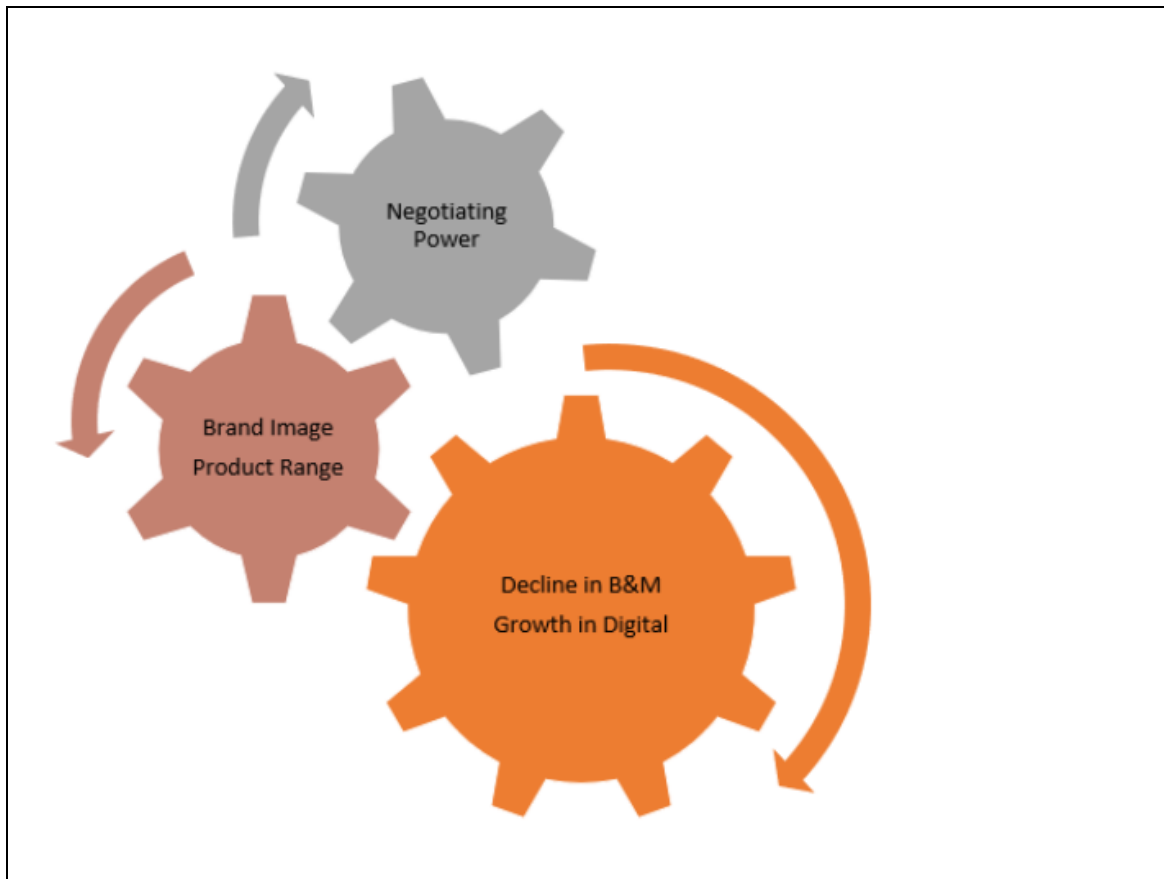


Figure 0-3 Key factors driving digital transformation

From the data gathered, Company Z found that their loyal customers from the traditional distributor model were mainly over 45 years old, while new younger customers made a good number of purchases through Company Z's own website, where the whole product range is accessible. Sensing this great opportunity from digital strategy, Company Z decided to adjust their brand image to acquire younger customers (the Xennials) while maintaining the loyalists.

"Our product is ready to take us to another level in style and we know the consumer wants this from us" – COO, during a Digital First presentation.

Having experienced impressive growth in global digital sales after re-platforming the website in 2017, and with the expectation of gaining greater negotiating power with sales partners and being close to customers, Company Z recognised great potential in further developing the digital strategy (Figure 0-3). The success of re-platforming encouraged the new direction of the business, and consequently the

Digital First strategy (Figure 0-4) was gestated and then launched across the whole company the following year (2018). This drives the change of the operational model into the Digital First model by putting the customer first. In this new model, also known as the digital D2C (direct to customer) model, digital in all its forms is the enabler for the rest of the business. The Chief Operating Officer (COO) has been leading the strategic transformation for the digital D2C business model.

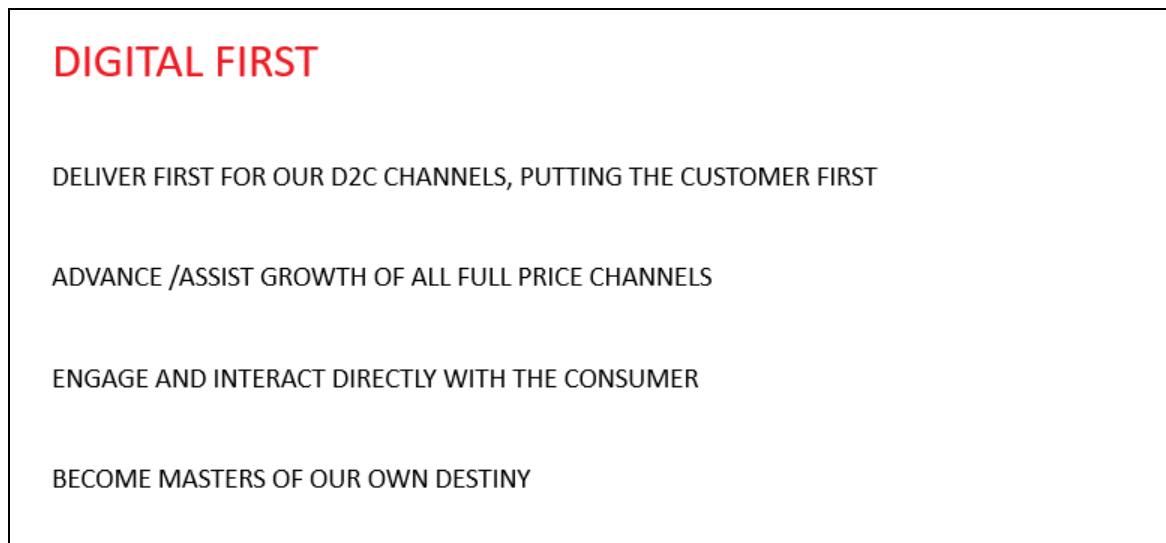


Figure 0-4 Digital First (Source: Company Z document – Intro to digital)

“... once we re-platformed, there was obviously a big spike quickly in terms of sales. And that really made everyone in the business sit up and take notice, that there was an absolute opportunity for the digital business to grow. And so the .com business, by growing, it was clear that we had an opportunity in digital sales overall. So not just .com, so marketplace, pure plays, departments online, and also digital sales. So that was kind of where Digital First got born” – Global General Manager in Digital.

There have been a lot of challenges alongside this digital opportunity during the execution of the Digital First strategy. Having been set up as a traditional company and relying on the distributor model, the whole company outside of the digital department needed to change their mindset to adapt to the digital

transformation. At Company Z, with the majority of people having spent most of their careers working with traditional wholesalers or retailers, it could never be a simple shift in their culture to adapt to the fast-changing digital business environment.

“... everyone will try and be Digital First, but it's very different to put along the PowerPoint slide than actually do it. ... But the digital transformation takes years and years rather than just being able to, you know, say you are now Digital First. I mean, we're not, we're still a wholesale company that really is trying to be digital, but it's not a seamless process” – Global Digital Marketing Manager.

“... Digital First really was about how do you make the rest of business catch up? And how do we deliver that? How do we deliver a digital business to the consumer? You know, we are not just digital, we are also wholesale, we are also retail, we are also a marketplace, we are also pure play, we are also bricks and mortar. So Digital First is probably the hardest operationally to achieve, because you have to deliver so much dynamically, quickly. So that mindset is quite difficult to change” – Global General Manager in Digital.

“... as a company, it's a really big deal, more of a big deal than it's for us, because we're already part of it.... the whole culture is changing. ...there are some people maybe in wholesale, ..., it's their job to look after John Lewis. Some of these people, they could be doing this job for 30 years, they can be in their 50s age. And now they need to think about the digital world and how it works...” – Head of Customer Experience.

In order to achieve the digital transformation, Company Z built a group of key people (Global General Manager in Digital, Global IT Director, Global People Director, and Global Marketing Director), led by the COO, to drive this digital

journey across the whole company. This group of key leaders have been making efforts to transform the culture at Company Z for digital adaption. Therefore, they built up the digital team (shown in Figure 0-5; the team structure is further discussed in the next section – ‘The Evolution of the Digital Team’) beyond the original e-commerce function by recruiting new people and changing the mindsets of traditional teams through consistently showing the benefit of being digital.

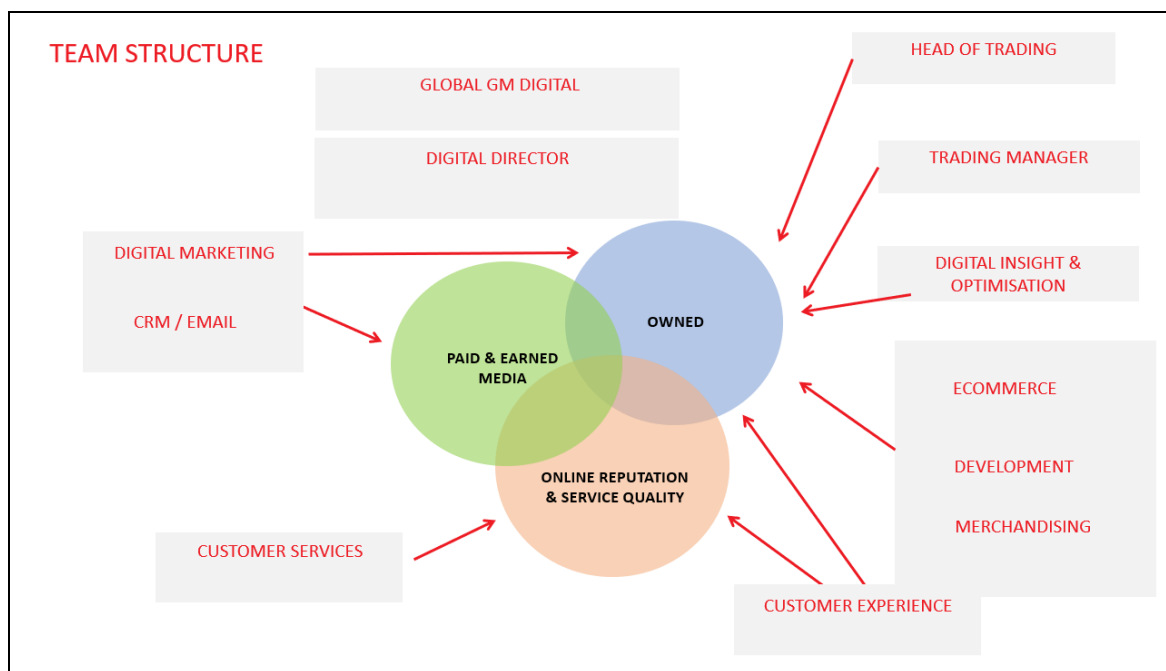


Figure 0-5 Digital team structure (Source: Company Z document – Intro to digital)

“We bring in more senior people into the business, who were Digital First and thinking about the digital focus and the digital footprint for the business, I think that moving from that point to where we are now, it’s been a huge kind of step in the education piece of the business” – Global Head of E-commerce.

“... Where digital was native to them, there is not a question about ‘How do we become digital?’ – they already are. And that means that there’s not a question

of how to train, how to think about that mindset. It's already there in their inherent behaviour. And then that sort of spreads in the organisation. So their mindset, it's really about how do we translate that to other departments? How do they understand what the mindset is here? And how can they deliver and support that in their business?" – Global General Manager in Digital.

Over time, Company Z recruited a number of experts in digital, who had a forward-thinking digital mindset. Their way of thinking and operating has propagated throughout the company. Meanwhile, to facilitate the transformation of the inherent culture, there has been consistent companywide education regarding the reason why digital is important to Company Z. These reasons have been categorised in Table 0-1. These ideas, backed up with data and evidence from Company Z's digital business, are regularly disseminated in different forms, including presentations, conversations, and meetings.

Category	Reasons
Direct-to-consumer relationship	<ul style="list-style-type: none"> - Direct feedback and communication with end consumers - Company Z can test and launch exclusive styles to the market - Customer insight, build on learnings
Brand	<ul style="list-style-type: none"> - Allows Company Z to educate consumers on the Company Z UPSs - Give the consumer the best overall brand experience - Showcase the global brand messaging: "Made for living in"
Margin	<ul style="list-style-type: none"> - Significantly higher margin than other channels
Education	<ul style="list-style-type: none"> - Allows Company Z to educate consumers on technology & USPs
Range	<ul style="list-style-type: none"> - "Flagship" product offering with widest range of all Company Z products - Partner buy with other global regions to offer exclusive product

Table 0-1 Why is digital transformation important to Company Z? (Source: Company Z document – Intro to digital)

"Some people adopt it, some people don't, I guess it depends on the individuals. Some departments don't like change, some people don't like change. Some people embrace change and want to join the journey. I think it's about spending

more time helping those that don't understand what digital is about and why it's good for everyone. So that's a journey. And that's a conversation that you had to have over and over and over. It's a onetime conversation” – Global Digital Marketing Manager.

“You have to show benefits. You have to show the impact, you have to show sales margin, customer feedback, all sorts of reasons, efficiencies, operationally or, yeah. And it's about constant review. So it's learning and reviewing. So we have lots and lots of presentations where we tell people what we are doing. ... And you can see over time, some people are more and more comfortable with digital. And if they're uncomfortable, that's when there's usually a barrier over time it becomes normalized. I don't think people really think about Digital First, we just think about being digital. That's it” – Global Digital Marketing Manager.

The Evolution of the Digital Team

Since the Digital First strategy was launched across the whole company, the team has moved from solely e-commerce to a more multi-functional digital team (Figure 0-6) over time. This evolution has led to the requirement for knowledge diversity within the team. By bringing in specialists within each area, the development of the sub-teams in the digital team has enhanced the breadth of knowledge.

“I guess difference between digital and e-commerce for me, is the inherent behaviours. E-commerce is this quite a broad brushstroke around buying and selling online. To be a truly digital business, you have to understand tech, you have to understand customer behaviour, you have to understand analytics, you have to understand behavioural. Yes, for us, I think it's a, it's really a layered approach. Yeah, it's quite difficult to I guess to describe” – Global Digital Marketing Manager.

“We have always had a marketing team, and a trading team and a merchandising team and an email team. The difference is now that those teams have gone from one or two people to four, five, six, seven people. And then and within that the remit of each of those many departments has been grown. They have now got three or four different arms to them within each mini department” – Global Head of E-commerce.

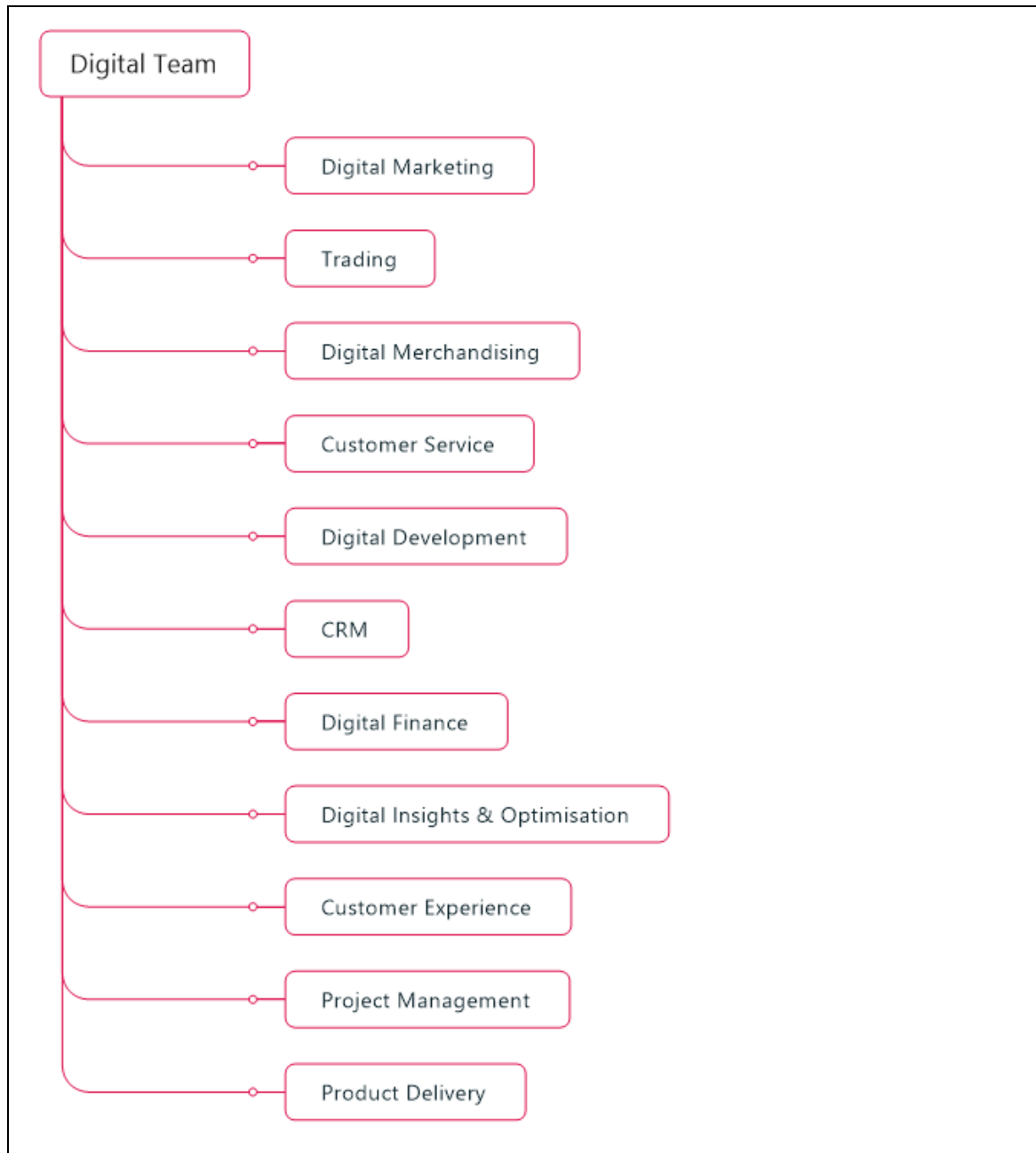


Figure 0-6 Org chart of the digital team

An example of the evolution in the function of a sub-team can be seen in the digital marketing team. They have gone from just focusing on paid search marketing to now covering online display marketing, paid social media marketing, and affiliate marketing, as well as Amazon marketing (looking after the trading and marketing of the Company Z store on Amazon). A similar evolution has been

undergone by the trading team, who were only focusing on daily selling online during the e-commerce stage. In 2019, there were regional sales located in the following respective areas: the US and Canada, and the UK and EU. More significantly, within the trading team, there are specialists focusing on content (product descriptions, images, and videos), specialists focusing on the numbers and metrics (visit sessions, conversation rate, orders, product listing page performance, gross and net revenue, etc.), and specialists focusing on A/B (bucket tests or split run) testing and MVP (minimum viable product) testing.

Alongside the key teams, including the digital marketing team, the trading team, the merchandising team, and the customer relationship management (CRM) team, Company Z has also developed supporting functions within the digital team. They recruited a head of development to enhance the development function; a member from the finance department was moved into the digital team to support digital finance analytics; Company Z built a customer experience arm of the team, including user experience (UX) and user interface (UI) design; a digital programme manager was recruited to oversee a series of projects that deliver strategic outcomes from the view of the entire business; product delivery function (referring to website feature implementation) was developed with a product owner and a business analyst, and led by a head of digital delivery; digital insights and optimisation has been introduced and developed for analysing and understanding data.

“Well, it was a traditional e-commerce team. Yes. And the digital functions are quite different. We didn't have all of the key heads that we have now. So we didn't have a development manager, we didn't have UX or UI, a lot of the heads that we bought into re-platforming site we had to bring in from contractual basis. And then over time, we've bought into permanent heads” – Global Digital Marketing Manager.

To elaborate, for instance, the digital insight and optimisation team was established in 2017 in order to drive the business forward based on analytics. It helps the business to understand how customers are interacting with them, how

they are purchasing, and how they are using the website. The digital financial analyst supports the digital team with respect to their budgets and forecasting. The in-house development and scrum team (a team with an agile form of the development process) are helping to look at the user experience and user journey, and then boosting how they trade and how they market the site. After building a customer experience function, a user experience team was recruited in 2017 to support the business.

“So we still got trade, buying, merchandising, marketing, but now we bolted on analytics and insight. And they're almost like a service department. They service trading, and they service marketing with information. And they enable them those teams to do their jobs better” – Global Head of E-commerce.

“... (user experience) is a new area we've had for about two years. So and that's gone from zero to three or four people. And we've got some consultants that are part of that. So we've got two kinds of permanent full timers. And then we've got a couple of other people that come in from a design point of view just to support on a weekly basis” – Global Head of E-commerce.

The digital team has grown to become the biggest individual department in the company. In 2019, there were over 50 people in the team, representing more than a quadrupling of the team's size from 2014. This growth in the team has coincided with a year-on-year doubling of revenue from 2016. The office space of the department is now twice as big, with modifications to the building being made to accommodate the growth.

For instance, the customer service team has grown from three people in the UK and three people in the US, to eleven people in each of these locations. Their roles are similar to before, but the volume of contacts that they receive has greatly increased. The channels that the customer service team are using to communicate with the customers have grown because of the technological

advancement. Now the customer service team can speak to customers using customers' preferred channels, including phone, email, and a newly launched live chat facility. Company Z is still looking at other ways to reach customers and enable customers to reach them.

As the digital business grows, the frequency with which the digital team interacts with other departments is also increasing. The demand placed by the digital team on other departments has also increased, and it has become quite a resource-absorbing team. For instance, they have many requirements from the IT department, finance department and creative service team, and these requirements are likely to increase in the future. These departments service the whole business, and therefore, the supply of these resources can be restricted at times. An example of this is shown in the case of the business intelligence (BI) team in the IT department. BI services the whole company, giving data back to different areas of the business (wholesale, digital, the board and finance, etc.). In order to hasten the response time of data turnaround, the digital team funds a full-time position in the BI team to support their requests specifically.

"We need 10 times as many pictures as we did four years ago, we need 10 times as much financial support and templating than we did a couple of years ago, because the business has got so much bigger, the requirements and the time scale, and you know, the time to time it takes to do everything is longer and more complicated and with more layers and levels of information" – Global Head of E-commerce.

While the digital team requires more resources, it also supplies more data for the whole company. As the digital business grows, a lot of information about the business and customers is collected and analysed. This is unique for a wholesale business that has been driven by a distributor model. Because Company Z cannot get much insight back from the wholesale partners on sales and product and customer demographics, the business is relying on the digital side to pump that information back into the business funnel.

“So we know how old our customers [are], how often she shops, what she's buying, when she's buying it, what device she's buying it on, how regularly she's coming back to the website, we know all of that information. And we can, we can then inform the rest of the business a lot more, which you know, having more people on the team and more function and more analytics insight, it helps with all of that. And it makes the business stronger and more accurate in the products that they're designing and making” – Global Head of E-commerce.

Since the establishment of e-commerce in 2010, Company Z has been trading online for about nine years until 2018. The sales curve (shown in Figure 0-7) shows modest growth from 2010 to 2016, before a dramatic growth spike in 2017 when the new platform launched and the Digital First strategy began to form. Currently, the digital team are doing much more than just e-commerce, growing wider and with more functions. They have become involved with all of the marketing and nurturing programs. Consequently, the digital team have an increased influence over the Company Z.com business, and they are likely to have greater influence over the business with third parties in the near future.

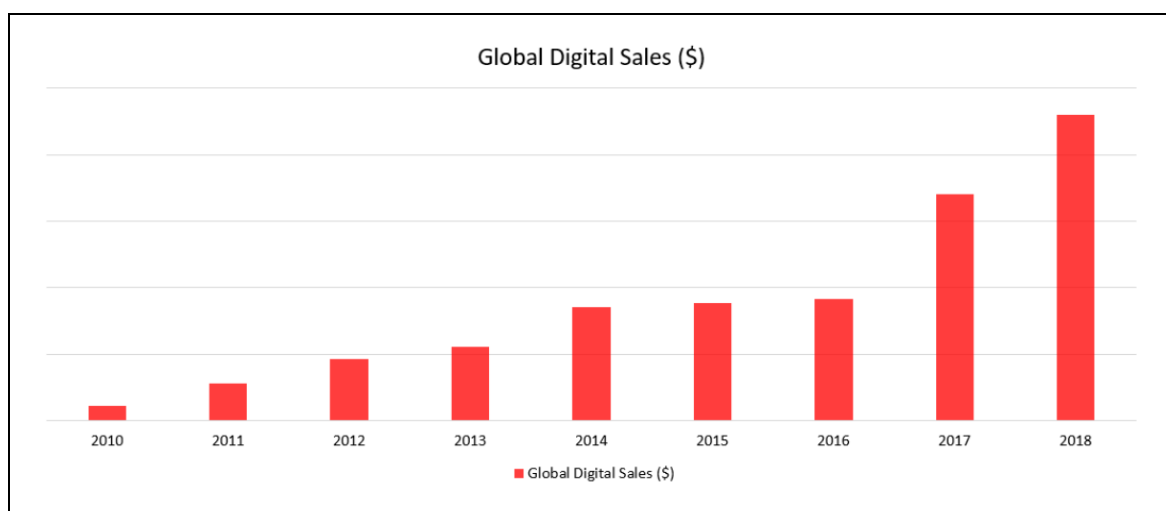


Figure 0-7 Global digital (official website) sales from 2010 to 2018 (Source: Company Z document – Business transformation & customer experience)

“I mean, when I used to sit in, in my management meetings, when I first started, I would be almost ignored at the table. And actually, digital was never really considered when we were doing photo shoots. And digital was never really considered when we were doing buys, and merchandising and you know, where we sat in the office and the size of the team wasn't considered. And we were sort of left as you know, ‘They sell stuff on the website’ kind of mentality. But now it's completely changed. And we're now the first part of the business that anybody comes to for information. And we're also the first part of the business that are considered in any output from the business. So when marketing campaigns are being created by brand, they come to us for our requirements, you know, ‘What do, what do digital needs to run the business successfully?’ and previously, that wouldn't have happened, we would have just got given a set of images and gotten ‘There you go, do what you want with them’. Whereas now they're saying ‘What do you need? How can we support you in, with the images that we're giving you, with the branding that we're giving you, with the fonts the colour?’” – Global Head of E-commerce.

A.2.3 The Emerging Era

Digital Incubator Lab – Adaptivity from Consistent Learning

To respond to the unpredictable, fast-changing digital environment, Company Z takes an agile approach for their Digital First business with technology as an enabler. As the digital business reported great successes and projected future growth and impact, a number of decisions needed to be made regarding updating or introducing new technologies. The digital market environment also allows Company Z to test new ideas and technologies on a small scale without rolling them out to the whole business, also described as business as usual (BAU) at Company Z. To provide the capability for testing new ideas, learning from the generated data, and adapting to the fast-changing digital environment, the

company started to build the incubator lab in mid-2018 and launched it in September 2018.

The incubator creates an environment where small ideas become scalable and early-stage ideas are fostered and developed. Tests that may not survive “Business as Usual” can be nurtured and carried out in the incubator. A core activation team was assembled of key leaders from across different departments, with the CEO and the COO as the project sponsors. Focus groups for learning, analysing, and adapting are organised with the support of other members with functional expertise for relevant projects. One benefit of the incubator lab is that it can provide an understanding of new technologies and ideas and the costs associated with them. Another benefit is that it helps to foster a culture of thinking and testing by allowing ideas to be tried and failed with the mindset of “fail fast – learn – adapt”.

“It helps us to focus on all the new things that our partners are doing. It helps us test it early and optimise it early before the products go to market. So it means that when those products are launched within those platforms, we've already optimized. So we've done the hard work already. So yeah. Incubator is an enabler for sure... And making sure you're future-proofing your business, because some things that are small now might be a big part of the program later. So in social media, for example, lots of the tests that we do in [the] incubator, we know is a key focus for Facebook going forward. And they like change your rules around, what you can and can't do as a brand. And therefore, we're already testing it ahead of time. So we are prepared for change early, so it's important to future-proof” – Global General Manager in Digital.

To support the incubator, the CEO moved out of their office to give the room to the digital incubator lab. It was used for a few months in 2018 and a number of tasks, mainly focused on new digital marketing technologies (Figure 0-8), were conducted there. An example of this is their work with their programmatic display partner to test the new technology called Scoota. Here, A/B tests were carried

out between the native ad (dynamic Scoota ad) and normal programmatic display. The result of these tests saw a massive increase in click-through rate, but not the same amount of conversions. Therefore, the idea has been developed and a test using a hybrid between a native ad and a display ad is planned.

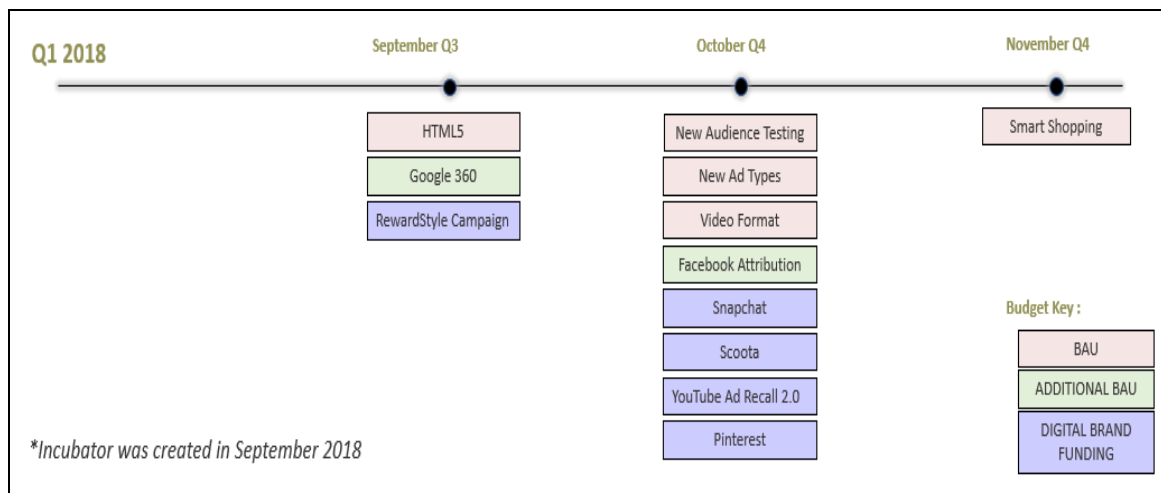


Figure 0-8 Incubator success 2018 (Source: Company Z document – Incubator company presentation)

The incubator in 2018 allowed the digital marketing team to test, learn, and identify opportunities for more brand-building activity as well as tactics to drive ROAS (Return On Advertising Spend). Therefore, they can make more informed decisions about allocating their digital marketing investments. However, the incubator tasks were operated by members of the digital team, and the digital team had to focus on their financial performance for BAU, especially at the end of the year; as a consequence, the incubator lab was shut down for a few months in the fourth quarter of 2018.

“Yeah, so the incubator is there. We use it for a few months this year (2018). And then we are just so involved in trade and trying to focus on performance. So we couldn't focus as much as what we did, probably like 20 tasks in the incubator. So we were really involved in that, and still are. So it will be set up again next

year. But the incubator physical space is still on the sixth floor” – Global Digital Marketing Manager.

“Well, it's been, it's been put on the back burner for a little bit, because of, you know, Black Friday and Christmas, there is a lot of, like, demands across business for data for other stuff. And also, I think we just have an ending many initiatives in the incubator because everyone's trying to reach certain targets. And we're supporting with that. But it's coming back from next year (2019)” – Digital Insight & Optimisation Manager.

Because of the success in 2018, Company Z re-launched the incubator in early May 2019 with a much bigger scope. The schedule of the incubator has expanded to cover the marketing roadmap, the technology roadmap, and the Qubit (a platform for personalising website experience) roadmap. The digital marketing incubator roadmap continues and expands upon the tests from 2018, working with their four key partners on furthering the programmatic display tests described earlier, social media tests, paid search tests, and conducting the affiliate tests.

“The idea is to get ahead of the curve, essentially, to beat our partners to the punch and kind of be able to make quicker wins and then put more money behind it. So with all of these partners, we will set up split testing, so I will essentially take our audience groups, divide and control in a test cell, test the different ad types, and we'll get on to all of the ones we're testing this year. And then assess against our control activity or BAU activity. Hopefully all of the tests work. Some I assume won't, but the ones that do work will basically move into our BAU activity, you put more spend behind them... And we have 20 to 30 tests lined up throughout the year” – Global Digital Marketing Manager.

The technology roadmap consists of tests involving modifications to the website, such as the facility for live chat for customer service, the new platform for fraud protection, and opening delivering in Switzerland for the Brexit trial. The Qubit

roadmap involves experiments by presenting different website designs to customers in real time. Different metrics such as conversion rates are used to assess the performance of the different website versions. The designs with positive outcomes are then passed along the technology roadmap for the actual website development.

“...we mainly look at the impact of some of the sites that we're testing, and the stuff that we're putting on site. So basically, what we work with is a platform called Qubit. And what Qubit does is that it allows us to present two different versions of the page: for example, a personalized experience versus what we have in the control version, to segment our users. And then run the test during a certain period of time where we're able to assess how it impacts different metrics on the set” – Digital Insight & Optimisation Manager.

With the aim of making Company Z future-proof, the incubator is a tool for the incremental evolution of the digital business. At the time of writing, the incubator tests involve more areas, linking digital marketing with customer experience through technology advancements and innovative testing. Aimed at growing existing and new markets efficiently, scale and automation, tested through working closely with their technology and marketing partners, feature heavily in the incubator roadmap. Data also features heavily in their roadmap to understand customers better and fuel customer retention and loyalty.

At the moment, people are doing incubator tasks as well as their regular daily jobs in BAU. To maintain the incubator's momentum, Company Z's original intention was to hold regular incubator meetings either weekly or fortnightly. However, most of the incubator stakeholders are in the digital team, and their main responsibility is in BAU, where their time is in great demand. Therefore, it has been common for the incubator meeting schedule to be disrupted by emerging issues that require prioritisation. Aiming to improve the efficiency of the incubator, there is a plan to establish a digital incubator team, separate from the digital team and solely focusing on the incubator project. The intention is to separate the incubator tasks from the BAU, with two different teams focusing on

the two areas. As a result, the digital team can focus on day-to-day trading, and the new incubator team can be brought in specifically to focus on the tests and experiments.

“So [the] incubator was brought in to test and learn. So we wanted to focus as a core group of people on new things. And then learning from those new marketing and development pieces, and then funnelling those back into the rest of the business, if they work. If they don't work, stop” – Global Head of E-commerce.

Customer Data Platform (CDP) – Delivering Personalised Customer Journeys

Learning from data to understand customers and developing strategies based on customer data are essentials for the daily work in the digital team. As discussed above, the digital insight and optimisation team was built two years ago to support the digital team from the perspective of analytics. However, the key tools they use, such as Google Analytics (GA), can only allow Company Z to understand their customers on an aggregated sample level rather than an individual level. Therefore, the capability of learning from data and offering a better customer experience in the customer journey is limited.

“Well, Google Analytics will let you report, but it's an aggregated sample level. So you can't then target that person with the next action, because you just been told that 500 out of 1000 people, you know, look, you know, went from a blog to Facebook. So this is this, is like a popular myth at Company Z is that we know how old our customers are. Google Analytics says 80% of your customers are between 40 and 60. That doesn't tell you which ones. So if you want to do some marketing to them, you couldn't do that. I mean, you can if you do use, you know, use Facebook or Instagram, because I want this, I want this ad to be shown to people who are between 45 and 60. But you still don't have a kind of idea of what

you know: you still don't know at an individual customer level" – Digital Programme Manager.

At the same time, as the digital business grows, the digital team has become multifunctional, with different platforms used in respective areas. A consequence of this is that data remains segregated and is difficult to put together. Although the IT department uses the data lake to combine the data, including both digital and non-digital data, it cannot provide the specialised capability of focusing on customer data for customer targeting. Therefore, in order to develop a better customer experience and targeting strategies, a full understanding of the customer profile and journey is crucial. This has become the obstacle that the digital team are currently facing and prevents further development.

"So all of the CRM data and all of the Google Analytics data is fed into the data lake. So all of the business or any business data goes into the central pool of information: we can then use Tableau, we can then pull information out of it. ... We're looking at bringing in another kind of technology to support the tweaking and fine tuning of all of our data. So CDP will allow us to start really analysing information that we have and help us to get the information more clearly. So that we can work out strategically, who needs to see what and when from a customer point of view" – Head of E-commerce.

For instance, the CRM team, evolving from the e-commerce email team, manages the email channel, based on different criteria of customer segmentation (characteristics, habits, and behaviours). However, they can only achieve macro segmentation (i.e. segmentation using variables with a broader scope) with their current CRM platform. For example, Company Z uses a traffic-light segmentation of green, amber, and red, based on the customers' level of engagement, for email correspondence. The customers with higher engagement (green) receive more frequent emails. This CRM system (platform) is reliant on customer registration and the only method to identify a customer is through their email address. In this case, customers who do not sign into the website cannot be recorded, and even

for customers who do sign in, their online behaviour before signing in cannot be tracked. As a consequence, a complete picture of the customer profile and their behaviours during the whole customer journey cannot be formed. This limits the company's ability to collect and analyse customer data, and understand this data, and in turn, restricts its ability to conduct efficient and effective personalised or real-time marketing campaigns.

"So in terms of what the platform can give us, we can segment by territory, by engagement with email, so whether they've opened it or whether they clicked on it over a set period of time. So we have a red/green status. And our greens are our most engaged customers, they always open, they look through, and the ambers, and this is over the last six months, the amber customers have opened or clicked in the last six to 12 months. And then the red customers have clicked through in the last 12 to 18 or beyond. And then we have a set of customers who just haven't engaged for a long time" – Head of CRM Digital.

From Company Z's digital practice, email marketing programmes prove to be a good channel in terms of revenue return, with low costs compared to paid media channels. Sensing a potential opportunity to be more customer-focused, Company Z started to work on launching the CDP project, with the intention of improving the capability to gather customer data with more variety and accuracy. This project is operated by the Digital Programme Manager in cooperation with the head of CRM Digital. The CDP, the repository of customer data, will allow Company Z to segment their data so that they can send targeted messaging to customers and give customers optimised journeys through various channels.

"Well, the danger is, is that if we keep sending emails to these people, will, we will get money back, you know, they will respond to them, but a diminishing rate. So we'll just have to keep sending more emails, that will get money back, but it will level off: eventually, they'll get sick of hearing from us. So that's why we're doing the CDP. Because we want to be much smarter about how we talk to people. And we want to have our messages that are consistent across all our

channels, so across Facebook, and Instagram, and on the website, and in email. So we can end up with like 500 segments or something like that” – Digital Programme Manager.

Multiple problems that are impeding the progress of the digital team are expected to be resolved through the CDP project. One problem can be seen in terms of data exchanges between different groups: for example, between the customer service team and the CRM team. The customer service team use a specialised platform, different from CRM's, to interact with customers. This prevents the exchange of data between the customer service team and the CRM team. On the one hand, the customer service team has no access to customer profiles and order history; on the other hand, the CRM team has no knowledge regarding the interaction of customers with customer services. This directly limits the ability of customer service and can cause communications between CRM and customers to be inappropriate or inconsistent. With CDP, the customer data can be captured into the same platform, and so can be shared, analysed, and deployed across the whole digital team.

“We would be able to search the email, see when they got in touch, but it's not actively shared. We don't have a CRM system. We can check how many times they've written to us, but I can't check how many orders they've bought... there is (data), but it's not sort of readily available... actually we can check with this kind of information, but if after the phone call, it's kind of too late” – Head of Customer Service.

“So, for example, something we might want to take into account, when we decide what email we're going to send to someone, is whether they've got a complaint with us at the moment that hasn't been resolved. Because they might feel it's a bit strange to have a complaint about some shoes, then we send them an email saying ‘Would you like to buy some more shoes?’ So the data is in Zendesk (the

platform used for customer service), but we haven't decided how we're going to get it out and feed it into the ... (the CRM platform). At the moment, they (the customer service and CRM platforms) are completely separate, so RedEye (the CRM platform) doesn't know anything about it. When we get our CDP, we're going to start, you know, we're going to capture that information into the CDP and use it to segment our data" – Digital Programme Manager.

The affiliate marketing shows good performance in ROAS and Company Z takes the "last click" attribution model to work with their affiliate partners, in which the "last click" is given credit for a sale or conversion. However, the influencers and content partners contribute more to the upper funnel, increasing the brand awareness of new customers, while the promotional partners contribute more to the conversion stage – the "last click" to fulfil the purchase. Therefore, in the "last click" attribution model, the upper funnel partners traditionally have to be on a higher commission rate to operate with. Moreover, Company Z cannot understand the distinct contributions of various affiliate partners at different touchpoints in this model, where only data on the last click is captured. With a new tool developed by the affiliate partner agency, the whole journey from the first click to the last click can be tracked. On the one hand, different attribution strategies can be applied to Company Z's affiliate partners. On the other hand, these data can be fed into CDP for further analysis and understanding of customer behaviours on an individual level. This in turn leads to the capability to develop personalised marketing.

"This is like quite a big question at the moment. And within digital marketing, it's really hard to track the value of influencers, because they'll never be the last click. It's very rare that someone will see a great Instagram post and buy it there. They won't, they'll go away, think about it, screenshot it, and then convert via like paid search because they have to click the first on Google, or they'll convert via affiliate, they'll be rewarded the last bit, not the blogger or the content partner. ... So an interesting, the Rakuten has developed a, an attribution tool called Kaydence. And that looks at the part, that basically takes the whole, the whole

timeline and looks where you can attribute, you know, value. So essentially show you where the influencer came in, where they display ads came in, where the voucher site came in. And then off the back of this, this allows you to essentially, you can pay commission on last click, which we do. Or you can say 'Hang on, I want to pay for different attribution strategy. And I want to reward 50% of the sales to the first touch point, the influencer'. So this sort of data, and these sort of platforms are allowing us to get a better view of the whole picture" – Global Digital Marketing Manager in Affiliate.

"... we only capture the last click ... we don't have the sort of journey analysis that we need. This would be really helpful... (the CDP) will help us to understand more about how the customers behaving after the sale, and before as well" – Digital Programme Manager.

To summarise the current situation at Company Z: the data are limited in extent, stored in multiple places, and not joined up; the processes are channel siloed and non-complementary; the messaging is inconsistent; the tools only allow crude targeting. The CDP will join up the customer data (a 360° view), with all the customer data in one place, connecting to all the data sources, increasing demographic identity points; it will allow self-management, through software operated by marketers and with first party cookies to drive real-time interaction; it will personalise the campaigns and messaging by segmentation based on every customer attribute, and enable real-time campaigns and consistent messaging across all channels. In other words, the CDP will enable Company Z to leverage customer behaviour for customer journey planning. With the intention of developing a 360° view of customers, Company Z sees the investment in a CDP as the next natural progression in its marketing maturity. Therefore, it invested in and launched the CDP project (Figure 0-9) in July 2019, with the purpose of maximising return on investment (ROI) on marketing spending, supporting performance improvements (increasing purchase frequency, increasing

customer lifetime value, and reducing churn), and propagating good practice between markets by learning from data.

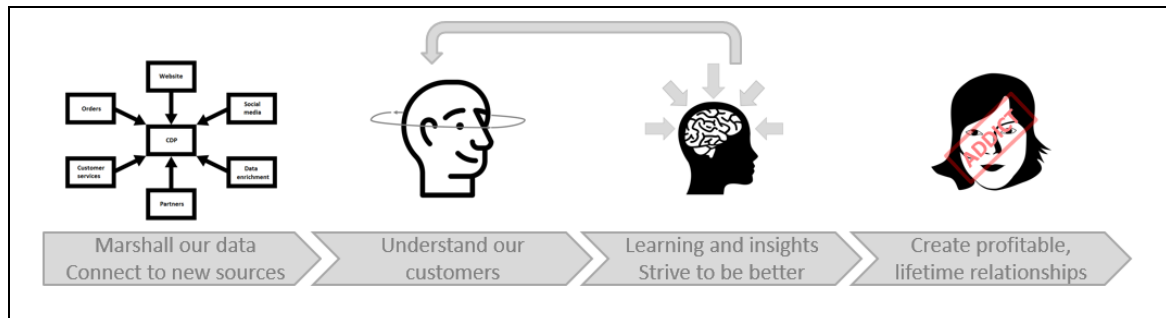


Figure 0-9 CDP (Source: Company Z document – CDP – Digital customer overview)

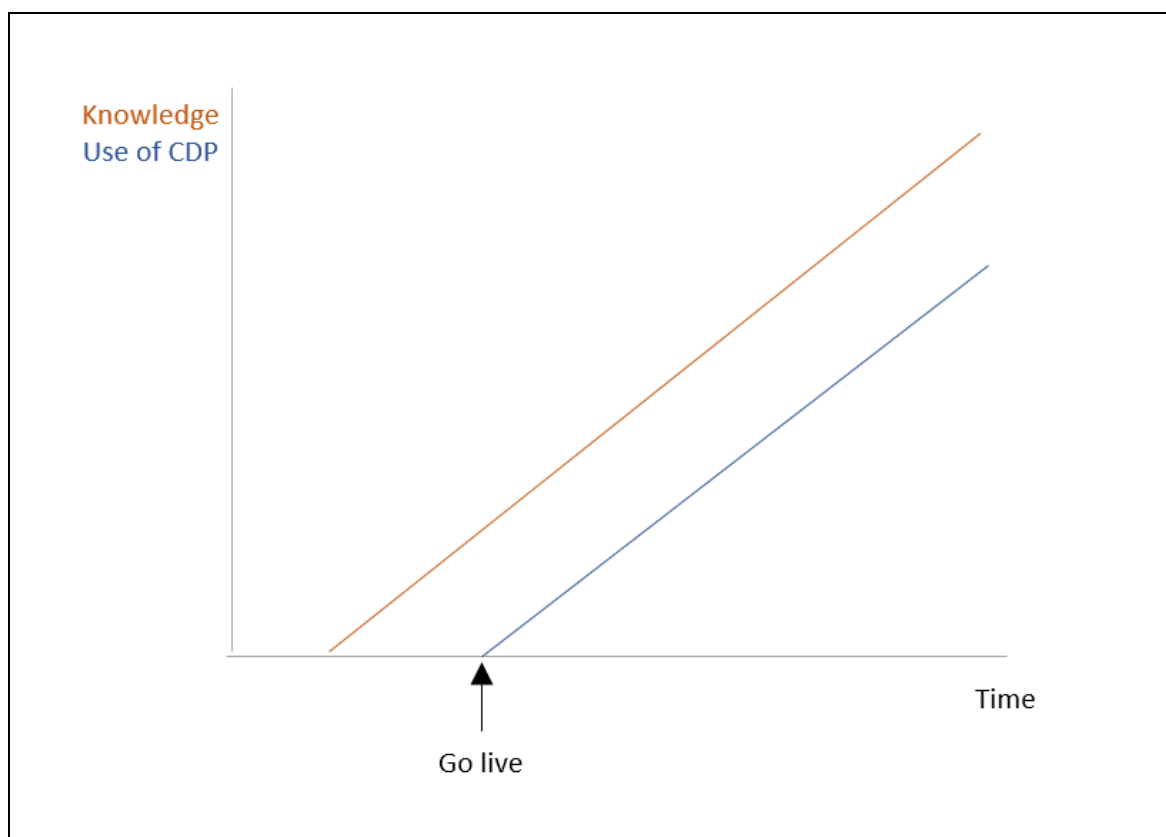


Figure 0-10 Building knowledge through fundamental course along with the use of CDP (Source: Company Z document – CDP milestone)

In September 2019, the status of CDP is that the initial investment has been made and it is in the setting up stage, with half of the data integration being completed in August 2019. It is scheduled to go live on the 1st October 2019, with the first campaign execution through the CDP. Nine sessions of the trainings about the fundamentals of the CDP will be started to build the knowledge of CDP and will be conducted throughout the practice in the use of the CDP (Figure 0-10).

“... so, our website is now writing all of the customer behaviour in this big bucket... having the software is one thing and having the people able to use it is another thing. There is training on the software, that starting on Friday, we're going to start a working group to put all the processes in place” – Digital Programme Manager.

Business-to-Business Online Team – Seizing B2B Opportunity

Learning from the sales data in 2018, half of the net sales were generated by traditional B&M, including the B&M wholesalers (32%) and B&M distributors (18%), and half through online channels, including Company Z's official website (30%) and business-to-business (B2B) online channels (20%), as shown in Figure 0-11. B2B online channels include all the online channels apart from Company Z's own website, and thus include the websites of the traditional wholesaler partners (e.g., House of Fraser, Debenhams, John Lewis, etc.) and pure B2B digital partners (e.g., Amazon). The traditional wholesaler partners used to be managed by the wholesale team, while the pure B2B digital partners were managed by the digital team. Sensing the great opportunity in digital B2B channels, Company Z decided to build a team specialised in B2B digital to further explore and develop it. A new Global Digital Director in B2B was recruited in May 2019 to lead the team focusing on B2B online. From this perspective, the Digital First strategy is not only about how to make a success of Company Z's own website, but also about how to replicate this success in other digital channels.

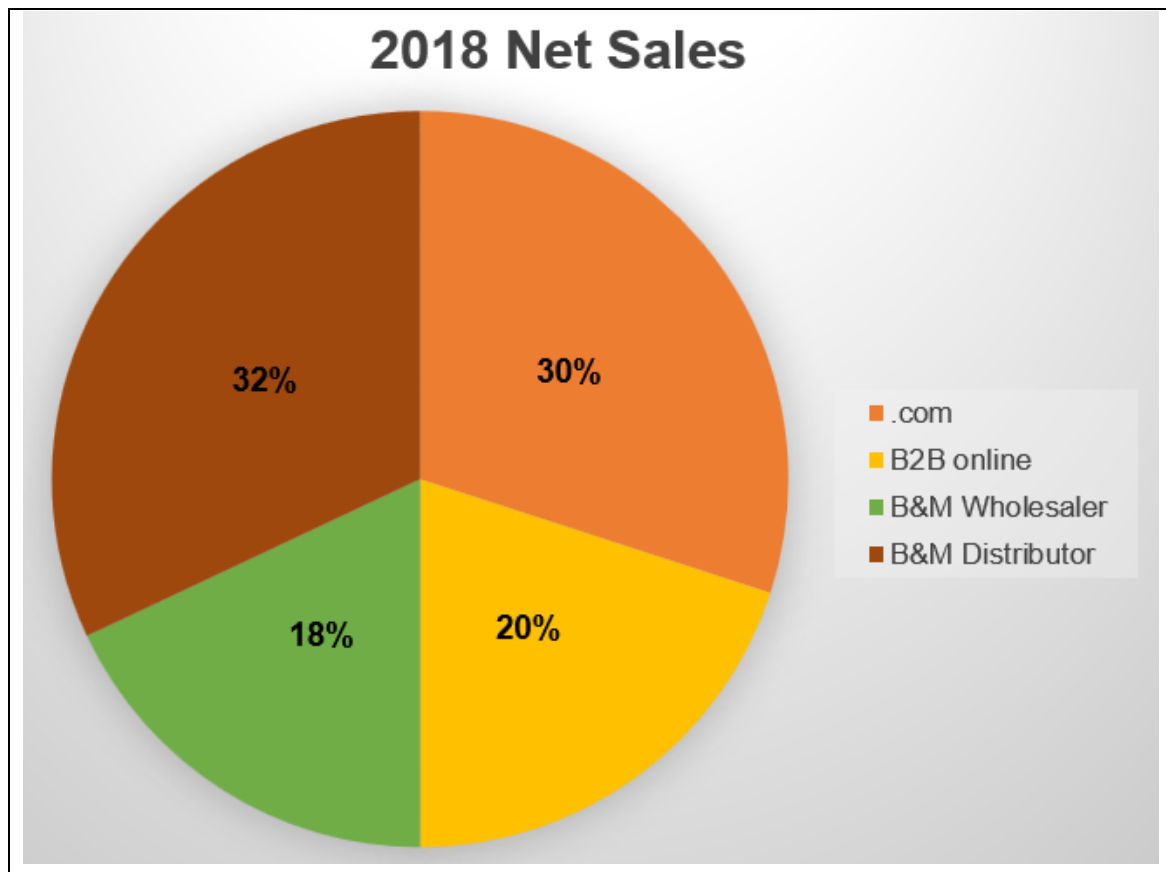


Figure 0-11 Percentages of net sales through different channels (Source: Digital transformation in business innovation – Observations at Company Z)

“This now means focusing our value chain (how we run everything internally) to deliver FIRST for our B2C/D2C channels (own websites, Company Z websites run by third parties, social channels, third-party pureplay, marketplace, retailer website and D2C retail connection). OVERLAY on our current businesses – retail and wholesale are still important to us and we expect them to maintain a healthy growth” – delivered by the COO during a Digital First presentation.

Modelling from Learning

Based on the customer purchase data and marketing spend, Company Z intends to build a customer acquisition model, through which it can understand better

about the new customer acquisition cost (CAC) and repeat customer cost. Within expectation, the data show that the new customer acquisition cost is much higher than the cost of repeat customers. However, Company Z is taking a new brand strategy, maintaining loyalists (over 45 years old) whilst focusing on acquiring new customers (xennials), in order to future-proof its business growth, as mentioned above; therefore, although it is a lot more expensive, it is critical to acquire new customers and then retain them to be repeat customers. The customer acquisition model is expected to aid Company Z in understanding the most efficient method of acquiring new customers and re-engaging customers for re-purchase, rather than waste marketing costs in an ineffective way. Company Z is also building a customer lifetime value (CLTV) model to facilitate the understanding of the total revenue that a customer is expected to generate. The CLTV model and the customer acquisition model are ways of building capabilities of understanding data, learning from data, and adapting to the dynamic features of the data, and are expected to result in higher market penetration and customer retention.

Operation Model Optimisation – Closing the Gap between Business and Customers

There are traditionally two buy windows per year in the retail industry, and this means that wholesalers or retailers buy twice from suppliers every year. This was the operation model that Company Z was using. However, digital business requires more frequent buy windows, as customers want more frequent newness.

“They (customers) want newness every week ... they don't see footwear as a slower trend than fashion, they think footwear is the same as fashion, it's part of fashion. So they want newness all the time” – Global General Manager in Digital.

With the principle of the Digital First strategy being “customer first”, Company Z has started to pay more attention to what its customers want in their daily routine. When it operated under the distributor model, it had two seasons per year: spring-

summer and autumn-winter. However, this is not competitive for digital businesses that, as previously mentioned, require more product newness. In the distributor model, taking a new product from concept to market takes 18 months. Compared to competitors in the fashion industry or in the digital arena, this is considered too long for the design team to stay relevant to the current fashion trends and restricts Company Z's Digital First business model transformation.

"So if we go back to the principal, which is Digital First, you start to have a look at what your customer wants on a regular basis. So if you imagine when we were a wholesale distribution business ... So you might have sandals etc, for the summer, and then boots etc, for the winter, and that's fine. But when you're digital ... you need new season where people go and look forward to changing wardrobe to get something different for New Year. But to keep people coming back to your digital channel, you need newness to keep it alive, so it gives your customers a reason to keep coming back and find something new..." – Global IT Director.

"... most people in the industry – like Zara and retail brands, fast fashion brands – are working one season ahead, which is they are on Spring/Summer 20, we are on Autumn/Winter 20. ... So when we start doing Spring/Summer 21, everybody else is going to be doing Spring/Summer 20: they are closer to market, because things come out later. So the shows and in September Fashion Week, they'll be showing Spring/Summer 20. If we want to be close to market, we need to be close to the season. So for Spring/Summer 20, when the shows come out, and everybody's just finished it, they can throw things in at the last minute, like if they've missed some chance, they can throw it in and still be able to have it online or in their own stores. But because we're wholesale and because we have a wholesale system, we still work two seasons ahead ... We're not Digital First, even though that is the goal: to be just Digital First. ... And so obviously with the process at Company Z, it's always been two seasons ahead, the future is to work one season ahead and close to the consumer" – Design and Creative Director.

To resolve this, Company Z has been working on a project called “concept to consumer”, led by the Global IT Director, With the fundamental objectives being to shorten the time from product design (concept) to market (consumer), have more frequent product updates, and allow clients more buy windows.

“So digital has got to be more like that – it’s got to be newness or tech coming through, and ideally, you make from maybe like two seasons a year to 52 seasons a year. So it’s something new every week. Now, that’s a bit impossible for us to do straight away. But if you look at a principle and say, ‘Well, that’s what we’re trying to achieve. How did we get there?’ It’s kind of hard to do it from where we are right now to 120 miles an hour. So you’ve got to do in stages. So we’ve now got the project called ‘Concept to Consumer’, that says “How do we make that happen a lot faster?” – Global IT Director.

By undertaking the “Concept to Consumer” project, Company Z and its partners hope to accrue the following benefits. First, the products can be designed more closely to fashion trends and so attract and acquire new customers. Secondly, more frequent new products on the Company Z website can satisfy customers’ desire for newness. Thirdly, it also offers distributors, wholesalers, and retailers an option to keep their products fresh and up to date with current fashion. Fourthly, it allows manufacturing partners to spread their production throughout the year, rather than having two periods of intense work with minimal work between them. Fifthly, by spreading production throughout the year, there is no need to store half a year’s stock at a time in Company Z’s warehouse.

“So really, it will solve the problem with the factories for capacity and will solve the problem with capacity at the warehouse as well, which is this idea of bringing your volume down quite a bit, which will save a lot of costs in the warehouse” – Global IT Director.

A.3 Challenges During Digital Transformation

As a shoe brand, having worked with traditional (non-digital) partners (e.g., manufacturers, distributors) since its establishment, both the rapidly-changing fashion industrial environment and the rapidly-changing digital business environment require Company Z to learn and adapt fast. Through these efforts toward Digital First, Company Z has been building its adaptability, transforming from a traditional distributor business model to a Digital First business model. Company Z has become closer to its customers than ever before and is trying to do even better in this direction. However, challenges still remain in its path.

- Technologies associated with Digital First require a high level of expertise. This expertise can be developed in-house or outsourced. The scarcity of this expertise within the team means that certain capabilities are reliant on a small number of people. Therefore, when these people are not available, these capabilities can be lost or delayed.
- Because the inherited operation processes and routines are based on the distributor model, it is difficult for long-term employees to change their mindset to support Digital First in a short time. Therefore, culture is still an ongoing challenge for Company Z to really achieve Digital First.
- The digital team has grown rapidly, as a cornerstone for the digital transformation. They have a big work schedule and a high demand on resources supplied from other departments. Therefore, it is a challenge for the support groups to keep pace with the digital team's rate of the working process.
- Experts in the digital field tend to be young and seek new challenges. For this reason, they often move to different organisations for different experiences after a while. Staff retention in digital is another challenge for building a steady team and consistently developing capabilities.
- Currently, the customer data are siloed and not readily available. The dissemination of customer data to interested parties that benefit Company Z

is an obstacle to overcome, especially for product innovation and business model innovation.

- In the digital sphere, there are many potential options involving innovations and technologies. It is not feasible to explore all of these avenues, so it is challenging to allocate the limited resource and determine which of these avenues to invest in based on limited information.

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