Situating the Shift: An Exploration of Context-specific Digital Transformation

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Statement of Originality

This is to certify that the content of this thesis is my own work. This thesis has not been submitted for any other degree or purpose.

Chapter 2 is based on a study that extends my Bachelor of Commerce (Honours) thesis completed at the University of Sydney. For this doctoral research, four additional rounds of data collection, corresponding analyses were undertaken since 2020, and a new research methodology (i.e., the grounded theory method) was applied to develop an original theoretical explanation. This includes the construction of a novel conceptual framework, the identification of new constructs, and a deeper theorization of the research problem within the broader digital transformation literature.

I certify that the intellectual content of this thesis is the product of my own work, and that all assistance received in preparing this thesis and all sources have been acknowledged.

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Signature Date

Authorship Attribution Statement

Chapter 2 of this thesis has been submitted as the following journal paper to the *Information Systems Journal* to be considered for publication:

Li, Y., Tan, B., and Sun, Y. "Leading Supply Network Digital Transformation: A Core Firm Perspective."

I led the study, analyzed the data, and developed the theorization and the drafts of the manuscript.

Chapter 3 of this thesis has been submitted as the following journal paper to the *International Journal of Information Management* to be considered for publication:

Li, Y., and Tan, B. "Navigating Digital Transformation for Not-for-Profits: Exploring Resource Fluidity."

I led the study, analyzed the data, developed the theorization and the drafts of the manuscript.

I acknowledge and express my gratitude to Dr Grace Park for her help in getting access to the case organization and her participation in data collection.

Chapter 4 of this thesis is to be submitted as the following journal paper to the *Journal of the Association for Information Systems* to be considered for publication:

Li, Y., Hsu, C., Lee, J., and Panteli, N. "Knotting Activism – Digital Transformation of the Media System for Social Justice."

I led the study, identified the conceptual lens, analyzed the data, and developed the theorization and the drafts of the manuscript.

I acknowledge that this paper is an extension of the following journal paper using the same dataset, with a different conceptual lens, perspective, and theorization, under review & revision at *MIS Quarterly:*

Panteli, N., Lee, J., Li, Y., and Hsu, C. "Seizing the moment: Kairotic times of institutional press actions driving societal change."

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As supervisor for the candidature upon which this thesis is based, I can confirm that the authorship attribution statement above is correct.

Supervisor Name: Dr. Na Liu

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Signature Date

Generative AI Attribution Statement

A Gen AI tool was used for minor text enhancement due to the student needing some assistance with scientific writing style.

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Abstract

Digital transformation (DT) is a prevalent yet complex socio-technical phenomenon that unfolds differently across varied empirical settings. While prior research has established DT as a process that reorients organizational identity, value propositions, and business models through combinations of digital technologies, much of the literature remains rooted in firm-centric, resource-abundant, and structurally stable contexts. To address the gap, this thesis explores the multifaceted phenomenon across diverse contextual settings, offering a contextualized and pluralistic theorization of DT. Specifically, this pluralistic inquiry is grounded in three in-depth qualitative case studies across three distinct domains: supply networks, not-for-profit organizations, and the media system supporting social activism. The first study investigates how a core firm exercises inter-organizational leadership to enact DT at the supply network level. It develops a theoretical framework that consists of four mechanisms – *strategizing, exemplifying, rallying,* and *assessing* – through which the core firm progressively builds leadership for DT across the network. The second study examines DT in a resource-constrained NFP organization, theorizing the concept of *resource fluidity* as a three-phase process—*identification, activation, and application*—that enables DT through transient, access-based resource configurations rather than ownership. The third study adopts the Ingoldian conceptualization of knotting to explore how activist momentum emerges within a digitally transforming media system. It conceptualizes activism as a process of *compound* and *concentrated knotting*, where media action lines interweave across journalistic, technological, and public domains. Collectively, this thesis enriches the DT literature by providing nuanced, context-specific theorization that accommodates both structured and emergent conceptualizations of DT, underlying the importance of context-sensitivity and ontological pluralism for understanding the multi-faceted dynamics of DT.

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Chapter 1: Introduction

1.1 Research Background: Contextualizing Digital Transformation

Digital transformation (DT) has become an imperative across various sectors (Baiyere et al. 2025), particularly as a persistent process accelerated by the COVID-19 pandemic (Sá et al. 2021; Yáñez-Valdés and Guerrero 2024), from private enterprises (e.g., Ritala et al. 2021) to public (e.g., Senyo et al. 2024) and not-for-profit sectors (Cipriano and Za 2024). DT refers to the process of implementing "combinations of information, computing, communication, and connectivity technologies" into an entity's properties to trigger substantial improvements (Vial 2019, p. 1). DT distinguishes itself from conventional IT-enabled organizational change as it aims for improvements beyond technological upgrade to support incremental changes, but a process of reorienting organizational identity and value proposition (Wessel et al. 2021) embedded in societal changes, alongside broader societal implications (Vial 2019).

While the overarching concept of digital transformation is broadly claimed, its manifestation, processes, and implications differ across contexts, depending significantly on the contextual offsets within which it is enacted (Hanelt et al. 2022). As such, it invites qualitative information systems (IS) inquiries to "engage in a dialogue with the empirical setting" (Monteiro et al. 2022, p. 9) to explore the qualitative differences between how DT is shaped and shaping human actions across contexts (Baiyere et al. 2023). Alongside responding to the ongoing call for context-specific theorization in IS (Davison and Martinsons 2016; Venkatesh 2025), this thesis aims to contribute to the IS literature and argues for the critical importance of context-sensitivity (Monteiro et al. 2022) in deepening the understanding of complex socio-technical phenomena like DT. Specifically, this thesis investigates DT across three distinct empirical settings: (1) supply networks, (2) not-for-profit organizations, and (3) media systems in supporting social activism. Recognizing that the nature and impact of DT are deeply embedded in and contingent on situational factors and organizational/industry characteristics, this thesis

seeks to present contextualized theoretical contributions for a rich understanding of DT within overlooked yet significant contexts, rather than universal theories that may oversimplify the complexity of the phenomenon (Davison and Martinsons 2016).

This thesis explores three empirical settings – supply networks, not-for-profit organizations (NFPs), and media systems – which were deliberately chosen to represent the overlooked yet societally significant areas where DT unfolds under very different structural conditions. Despite the differences, they share two features that make them theoretically valuable for understanding DT. First, the three contexts operate under external pressures that have forced digital changes, either under network-based competition, crisis urgency, or inevitable media convergence. Second, each context requires coordination or mobilization that go beyond traditional firm boundaries (Teece 2019).

Meanwhile, the contextual differences of the selected cases - in goals (i.e., for efficiency, mission, or public engagement), in resources (i.e., abundant, access-based, and distributed), and level of analysis (i.e., network, organization, or media system) – enable this thesis to surface contrasting pathways through which DT unfolds. Together, the three cases illustrate how context shapes not only the outcome of DT but also the very ontological nature of transformation.

In exploring these distinct contexts, this thesis also adopts two complementary ontological perspectives. Drawing on the categorization by Baygi et al. (2021), the first two studies (Chapters 2 & 3) adopted an entity-oriented perspective as supply networks and NFPs involve clearly identifiable organizational actors, structures, and decision-making processes that unfold in clock time, making it suitable to explore DT as a structured process, often characterized by discernible phases or stages in clock time (see Langley et al. 2013), that are shaped by contextually embedded entities and their interactions in such settings. In this view, DT unfolds

through a series of decisions, actions, and intentional adjustments by organizational stakeholders to achieve specific DT objectives and outcomes.

The third study (Chapter 4), on the other hand, adopts a flow-oriented perspective, investigating DT as a temporal becoming (Baygi et al. 2021) that is ongoingly shaped by the continuous lines in motion, without predefined trajectories or fixed goals (Ingold 2015), as the evolving media system and activism unfolds through diffuse, continually moving lines without fixed boundaries or structures (Chadwick 2011, Meikle 2011). By implementing the pluralistic lens on examining DT, this thesis aims to shed light on not only what changes (i.e., the outcomes) but also the diverse forms and processes through which changes become possible in different contexts, contributing to a more comprehensive, richer understanding of DT.

The ontological diversity allows the work to examine how different types of contexts require different theoretical treatments and to show that DT is not a singular, uniform process, but a multifaceted phenomenon that can be understood as structured, emergent, or processual, depending on the empirical setting.

To guide this pluralistic inquiry, this thesis is motivated by the overarching research question:

How does DT unfold across diverse contextual settings, and what mechanisms, structures, and dynamics shape the development of DT under varying structural conditions?

The following section presents a broad literature review on DT to situate my inquiry within the accumulated body of knowledge.

1.2 Digital Transformation: A Broad Review of Literature

While scholarly discourse on digital transformation (DT) has flourished in the IS field, its conceptual foundation remains contested. Early work framed DT broadly, which encompasses a range of phenomena, from IT-enabled organizational transformation (Besson and Rowe 2012)

to ongoing digital innovation (Nambisan et al. 2017). Recognizing the heterogeneity of conceptualization, recent IS work has sought to clarify DT as a distinct phenomenon, particularly from IT-enabled organizational transformation (Vial 2019; Wessel et al. 2021). Following the distinction, this thesis adopts the Vial's (2019) definition of DT 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" (p.1), which reorients the entity's identity and value proposition (Wessel et al. 2021).

At its core, DT is characterized by a qualitative (Baiyere et al. 2023), deep structure shift in an entity's organizational logics and routines (Baiyere et al. 2020). Importantly, DT is not solely initiated by organizational intent or decisions but is triggered by and embedded in the broader industrial or societal shifts (Vial 2019), thus yielding implications across individual, organizational, industrial, and societal levels (Dąbrowska et al. 2022). To provide a comprehensive view of the multi-level and facet socio-technical phenomenon, this section presents a broad literature review on DT. Table 1 presents a summary of DT based on three major research strands: (1) Antecedents & Drivers of DT, (2) Multi-dimensional Outcomes of DT, and (3) Conceptualization of the Nature of DT. Each research strand consists of core themes, their descriptions, and key supporting references, providing a structured synthesis of the extant conceptual understanding of DT.

Table 1: Summary of Existing DT Literature by Research Strands

Category	Description	Sources
Antecedents & Drivers of DT		
Technological Advancements & Opportunities	The rapid emergence and evaluation of technologies, including social media, mobile computing, analytics, cloud, Internet of Things (IoT) technologies, 3D printing, artificial intelligence (AI), and digital platforms, continuously present new opportunities and challenges. The inherent disruptive nature,	Hartley and Sawaya (2019); Piccoli et al. (2024); Piccoli et al. (2020); Ritala et al. (2021); Sebastian et al. (2017); Warner and

	generativity and convergence of digital technologies, alongside scalable digital infrastructures underpin new forms of organizational capability building and action potential.	Wäger (2019); Yoo et al. (2012)
Buyer Demand & Behavior Shifts	Ubiquitous buyer access to information and communication capabilities led to increased buyer expectation on business offerings and omnichannel integration for customer experience. The increased information transparency and control on communication also empower a shift in buyer-supplier power and increasing value co-creation behaviours, prompting organizations to respond the changing demands.	Castagna et al. (2020); Jocevski et al. (2019); Reinartz et al. (2019); Verhoef et al. (2015); Wlömert and Papies (2016)
Competitive Landscape & Societal Changes	The broader digitalization as a socio-technical transformation across sectors has situated organizations in the context of the 'digital age.' Traditional markets are disrupted by digital start-ups with new offerings and lowered barriers to entry, challenging the competitive advantages of incumbent players, and forcing them to strategic reorientation towards transparency-driven, boundary-spanning, and agile digital strategies.	Bharadwaj et al. (2013); Granados and Gupta (2013); Holotiuk and Beimborn (2017); Iivari et al. (2020); Morton et al. (2022); Seidel et al. (2025); Sundaram et al. (2020); Teubner and Stockhinger (2020)
Multi-dimensional Outcomes of DT		
Organizational Performance & Efficiency	Several dimensions of organizational performance improvements are associated with DT, including enhanced organizational innovative capabilities, financial performance, growth, and reputation. Digitalized and automated business processes also lead to improved operational efficiency by reducing slack resources.	Dijkmans et al. (2015); Du et al. (2016); Karimi and Walter (2015); Rosamartina et al. (2022); Svahn et al. (2017)
Value Creation & Business Model Innovation	The generative and converging properties of digital technologies enable organizations to redefine value propositions, and innovate their extant business models, such as shifting a firm's core value proposition from selling hardware to providing digital services, hence extending the product-based model into a servitization model.	Baiyere et al. (2025); Berman (2012); Cozzolino et al. (2018); Frank et al. (2019); Jin and Shin (2020); Palmié et al. (2022); Sabatier et al. (2012)
Individual & Societal Benefits	DT in sectors such as healthcare and in the context of societal crises like a pandemic led to improvement of individual quality of life, such as enhanced access to care with reduced costs. Building digital resilience can also effectively mitigate side effects of crises.	Agarwal et al. (2010); Bravhar and Juric (2017); Lee et al. (2024); Massaro (2023); Srivastava and Shainesh (2015)
Unintended Consequences	DT can trigger resistance from different levels of an organization, leading to failure caused by persistent pretending and avoiding responses to	Dąbrowska et al. (2022); Deng et al. (2016); Leong et al. (2016); Singh and

	incompatible digital platforms and dysfunctional information systems. Threats to social and emotional wellbeing of individuals, worker marginalization, and social relationship destruction could emerge as a result of DT.	Hess (2017); Wimelius et al. (2021)
Conceptualization of the Nature of DT		
DT as Radical Change	DT is conceptualized as a qualitative, radical shift that entails deep structure change in organizational identity, value creation, logics and routines. The implication of DT extends beyond organizational level to individual, ecosystem, and societal levels.	Baiyere et al. (2020); Dąbrowska et al. (2022); Ritala et al. (2021); Seidel et al. (2025); Vial (2019)
DT as Staged Process	DT is identified as composed of distinct and sequential phases to systematically develop (dynamic) capabilities and moving through phases digital maturity to achieve strategic goals of organizations. Strong organizational leadership, such as introducing Chief Digital Officers (CDOs) are important in orchestrating organizational actions and mobilizing organizational resources.	Bonnet and Westerman (2020); Kane et al. (2017); Singh and Hess (2017); Teichert (2019); Verhoef et al. (2021)
DT as Iterative & Emergent Process	DT can progress and regress in an iterative manner over time, without defined stages of life cycles following a sequential trajectory. The generative nature of DT could lead to both planned and emergent outcomes.	Pittaway and Montazemi (2020); Senyo et al. (2024)

Although DT is pervasive across sectors, the three empirical contexts examined in this thesis, namely supply networks, NFPs, and media systems, remain comparatively under explored in the IS literature despite their substantial societal relevance. Specifically, supply networks that play a pivotal role in shaping the core competitiveness and performance of product firms (Elliott et al. 2022; Lii and Kuo 2016), are often treated as either operational or technological settings in the DT literature (Hartley & Sawaya 2019, Preindl et al. 2020) rather than socio-technical environments where network-level DT unfolds and where inter-organizational leadership shapes the outcomes critically. Next, access-based resource mobilization contexts remain peripheral to the mainstream DT literature, which predominantly assumes profit-oriented logics. and stable resourcing that are rarely the case in NFP settings (Candler and Dumont 2010; Senyo et al. 2024). Yet, these organizations form essential parts in providing

public and community services and delivering social value (Guthrie et al. 2010), making their DT processes societally consequential. Finally, media systems represent a critical institutional arena through which public discourse, accountability, and activism emerge (Reese 2020). Despite the widening societal influence, the IS literature has dedicated attention to the digitalization of individual platforms (e.g., Miranda et al. 2016) rather than DT of the media system as a whole. This is notable as the media system is digitally converging while reshaping the temporality, public engagement, and visibility that existing DT literature do not readily capture. Together, the three settings exemplify contexts that are overlooked in DT theorization, leaving distinctive empirical and conceptual vantage points for advancing context-sensitive theorization of DT.

1.3 Research Design: Overview of the Three Studies

To achieve the research objective, this thesis comprises three in-depth qualitative case studies. Each study examines DT within a distinct empirical context (i.e., a supply network, a not-for-profit organization, and a media system) to investigate the situated mechanisms and dynamics through which DT emerges and evolves. This design aligns with the research objective by enabling a contextually nuanced and pluralistic exploration of DT to accommodate both structured and emergent conceptual perspectives (see Table 1 for examples).

All three studies adopt an interpretive, qualitative case study approach for several reasons. First, interpretive approaches grounded in empirical data are essential in investigating new or underexplored contexts (Walsham 2014). In particular, acknowledging that DT is a complex and multi-faceted socio-technical phenomenon, interpreting shared meanings of actors and situated practices is critical to generating theoretical insights (Klein and Myers 1999) for a comprehensive understanding of DT. Second, qualitative case studies allow the investigation of phenomena in their natural settings and allow for theorization from rich and highly contextualized data (Walsham 1995a). As such, this approach becomes instrumental in

uncovering the dynamic and emergent (Senyo et al. 2024; Vial 2019) patterns and processes of DT within their natural context (Langley 1999).

The first study utilizes the case of Topsun, a leading Chinese outdoor equipment manufacturer, to investigate how a core firm develops and enacts inter-organizational leadership to mobilize and coordinate DT at the supply network level. Utilizing a longitudinal qualitative case study (2019-2023) of a leading organization in its supply network aims to address the research question, "*How can a core firm effectively develop and enact inter-organizational leadership for successful SNDT?*" Guided by the grounded theory methodology (Glaser et al. 1968; Strong et al. 2014), this study inductively develops a theoretical framework from 25 formal and informal interviews. The framework consists of four mechanisms – *strategizing, exemplifying, rallying,* and *assessing* – through which the core firm progressively builds leadership credibility and exercises inter-organizational DT leadership to successfully mobilize network-wide DT efforts and a transition from internal to network-level DT. Theoretically, this study contributes to the DT literature by introducing the notion of inter-organizational DT leadership and its underlying formation mechanisms, offering a novel perspective to explain how DT can be initiated and sustained across organizational boundaries in loosely coupled supply networks.

The second study explores how not-for-profit (NFP) organizations navigate DT under conditions of resource constraints and heightened accountability. Guided by the research question "*How doNFPs identify and mobilize the resources required for DT without ownership?*" I conducted a qualitative grounded-theory guided case study of City Impact Church, a large faith-based NFP organization in New Zealand. Building out of 10 in-depth interviews from 2020-2021, I developed the conceptual notion of *resource fluidity*, which is a state enacted through a three-phase process: (1) *Identification* of resources with polymorphic potential, (2) *Activation* through organizational capabilities of envisioning, redeployment, and experimentation, and (3) *Application* guided by mission-driven governance. The findings

revealed that in the NFP contexts, successful DT is enabled through access-based and relational resource arrangements, given the strong reliance on voluntary or donation-based resources, rather than traditional ownership-based mobilization (e.g., Barney et al. 2021; Teece 2016). Theoretically, this study challenges the for-profit-rooted assumption of DT resource ownership and offers a contextualized model for understanding DT through access-based resource mobilization in mission-driven, resource-scarce settings that is socially embedded.

The third study investigates how the DT of a converging, digitally transforming media system of traditional journalism, digital platforms, and participatory forces that reshapes the emergence and evolution of activism by analyzing how diverse media action lines interweave to generate and exploit activist momentum. Guided by the research question, "*How do evolving action lines within a digitally transforming media system and their correspondences shape momentum for social activism?*" this study adopts the conceptualization of knotting and lines in motion (Ingold 2015; 2021b) through a qualitative case study of the UK Post Office Horizon IT Scandal, which unfolds within a media system that is evolving, converging, and digitally transforming. Drawing on the extensive archival data, the findings revealed two distinct yet interrelated knotting processes – *Concentrated Knotting,* where short-lived surges of visibility momentarily entangle collective action, and *Compound Knotting,* which sustains longitudinal momentum through layered and recursive interweaving. This study contributes to the understanding of how the digitally transforming media system ongoingly shape activism by theorizing activist momentum as a dynamic and temporally conditioned (Baygi et al. 2021) process within a living, evolving media meshwork, thereby moving beyond static or episodic views of activist mobilization (Della Porta and Kriesi 1999; Poell 2020), extending DT theorization to societal-level live processes.

1.4 Theoretical Integration

Overall, this thesis contributes to the DT literature by foregrounding the importance of context-sensitive theorization (Davison and Martinsons 2016; Hanelt et al. 2022) and pluralistic ontological perspectives in understanding how DT is navigated or unfolds across diverse organizational, inter-organizational, and institutional settings. The first study contributes to the understanding of supply network-level DT by theorizing a hybrid form of inter-organizational DT leadership. It reveals four mechanisms (i.e., strategizing, exemplifying, rallying, and assembling) through which a core firm mobilizes and sustains DT across a multi-tiered supply network, offering new insights into inter-organizational level leadership for DT beyond firm boundaries. The second study theorizes resource fluidity as a critical state for NFP organizations to navigate DT under resource constraints and heightened accountability. It introduces a three-phase process model, including identification, activation, and application, to uncover how successful DT in NFP contexts relies on access-based and relational resource arrangements, alongside mission-driven governance. Finally, the third study shifts the focus to the societal implications of DT, examining how DT of the media system shapes social activism. It reconceptualizes DT in the media system as an unfolding, emergent process of knotting. Drawing on the Ingoldian conceptualization of lines in motion and knotting (Ingold 2013; Ingold 2015), this study theorizes how activist momentum emerges through the recursive, interweaving action lines within a converging media system. Together, these studies underscore the importance of context-sensitivity in understanding DT - a complex socio-technical phenomenon – by offering a richer and nuanced understanding of DT as situated, contingent, and ontogenetically unfolding across various settings.

1.5 Thesis Structure

This thesis is structured in a three-study format, comprising three self-contained yet interrelated studies, each mirroring a typical journal publication structure and length. Together, these three

studies are logically organized to address the overarching research question: *How does DT unfold across diverse contextual settings, and what mechanisms, structures, and dynamics shape the development of DT under varying structural conditions?*

This thesis is organized as follows. Chapter 1 introduces the research background, reviews the DT literature, outlines the research design, and explains the theoretical integration across the three studies. It positions the thesis with the ongoing call for context-specific theorization in the IS field (Venkatesh 2025) and sets out the ontological and methodological foundations that guide the inquiry.

Chapters 2, 3, and 4 present three core studies. Specifically, Chapter 2 presents Study 1, "Leading Supply Network Digital Transformation: A Core Firm Perspective." This study investigates how a core firm can effectively develop and enact inter-organizational leadership to mobilize and coordinate DT at the supply network level. Chapter 3 presents Study 2, "Navigating Digital Transformation for Not-for-Profits: Exploring Resource Fluidity." This study explores DT in NFP context under persistent resource constraints and heightened accountability, developing the conceptual notion of resource fluidity as a key enabler. Chapter 4 presents Study 3, "Knotting Activism – Digital Transformation of the Media System for Social Justice." This study investigates how DT of the media system reshapes the emergence and evolution of activism, analyzing how diverse media action lines interweave to generate and exploit activist momentum. Finally, Chapter 5 provides a comprehensive conclusion, synthesizing the findings across all three studies, discussing their overall theoretical and practical implications, and outlining directions for future research.

Chapter 2: Leading Supply Network Digital Transformation: A Core Firm Perspective

Abstract

As Digital Transformation (DT) becomes increasingly critical for competitiveness, traditional product firms must extend their DT efforts beyond organizational boundaries to supply networks (SNs). However, the mechanisms through which DT can be effectively implemented at the SN level from a core firm's perspective remain underexplored. This study investigates how a core firm can attain and enact DT leadership to drive effective supply network digital transformation (SNDT). Drawing on a longitudinal case study of Topsun, the largest outdoor equipment manufacturer in China, this study reveals how inter-organizational DT leadership is attained and exercised within a SN through four mechanisms: (1) strategizing, (2) exemplifying, (3) rallying, and (3) assembling for supply network-level DT. Capturing the mechanisms in a theoretical framework, we present a conceptual innovation that elucidates a hybrid form of inter-organizational DT leadership. This study contributes to the SNDT literature by revealing the multi-stage mechanisms through which SNDT unfolds from the perspective of core firms.

2.1 Introduction

Digital Transformation (DT) is the process through which "combinations of information, computing, communication, and connectivity technologies" (Vial 2019, p. 118) give rise to fundamental organizational changes, including business processes (Baiyere et al. 2020), capabilities, value propositions, and structure (Wessel et al. 2021). The various opportunities and threats generated by digital technologies (Baiyere et al. 2025; Vial 2019) underpin the strategic significance of DT in almost all industries and contexts (Hanelt et al. 2022; Singh et al. 2020). In particular, DT is critical for traditional product firms that generate customer value

through developing, manufacturing, and selling tangible goods (Kowalkowski et al. 2017). These firms face not only considerable threats posed by "born-digital" (Sebastian et al. 2017, p. 198) firms but also increasingly complex and fast-changing business demands driven by technological advancements (Baiyere et al. 2025; Frank et al. 2019). For instance, the digital native, Tesla, has fundamentally reshaped the competitive dynamics in the automotive sector with software-defined vehicles powered by data-driven machine learning models (Teece 2018; Alt et al. 2020), forcing established automobile manufacturers like Volkswagen to confront new digital capabilities, compressed innovation cycles, and shifting customer expectations (Dungs 2021). As a result, there has been a widespread and growing commitment to DT among traditional product firms globally (Appio et al. 2021; Bilgeri et al. 2017).

Despite numerous successful DT stories (e.g., Dremel et al. 2017; Ivančić et al. 2019; Lutfi et al. 2022), global surveys suggest that 70% of organizations' DT efforts fail to achieve their pre-set DT goals (Bucy et al. 2021; Deloitte 2020). The high failure rate highlights a need for a more comprehensive understanding of effective DT for traditional product firms, which arises from two gaps in the existing literature.

First, there has been a growing shift from firm-based competition to a 'competing-supply-network' perspective (Farahani et al. 2014; Ricciardi et al. 2022), emphasizing the networked nature of contemporary product firms (Ma et al. 2020). Therefore, to navigate successful DT for traditional product firms, it is essential to explore DT beyond the boundaries of single organizations. In particular, Supply Networks (SNs), which is defined as networks of exchange relationships between firms of supply chains (Wiedmer and Griffis 2021), play a vital role in shaping the core competitiveness and performance of product firms (Elliott et al. 2022; Lii and Kuo 2016). It has emerged as a more accurate alternative to 'supply chain' in the modern world to reflect that product firms are typically not only part of one linear supply chain but many supply chains with heterogeneous, interdependent (Hearnshaw and Wilson 2013; Wiedmer and

Griffis 2021), and alternative buyers and suppliers (Braziotis et al. 2013; Elliott et al. 2022). As such, it is essential to explore how DT can be realized at the SN-level through coordinated, cross-firm efforts, and utilize emerging digital technologies (Adenso-Diaz et al. 2012; Singh et al. 2021). Nevertheless, scholarly understanding of how DT can be effectively implemented across an SN is still in its early stages as will be illustrated in the background literature section.

Second, as the complexity of SNs grows rapidly globally (Azadegan and Dooley 2021), coordinating DT at the SN level becomes increasingly challenging due to the heterogeneity and interdependencies among the firms (Hearnshaw and Wilson 2013). Such complexity necessitates effective leadership to implement a degree of control over an SN when coordinating supply network digital transformation (SNDT) (Giannoccaro et al. 2018). In this context, leadership operates at the inter-organizational level, which is conferred by an organizational body (Chetty and Agndal 2008) to influence other organizations toward achieving DT goals at the SN level (Lunenburg 2012). Nevertheless, there is a paucity of research on how inter-organizational DT leadership can be developed and enacted in the context of SNDT, which poses limits to our understanding of effective SNDT.

To address these research gaps, this study investigates SNDT from a core firm's perspective, examining how a core firm within an SN can develop and exercise inter-organizational leadership for effective SNDT. A core firm is defined as an organizational entity that leads an SN in terms of scale, financial performance, bargaining power, and strategic vision, to drive the network value and coordinate SN participants via "compatibility and direct network management" (Pierce 2009, p. 324). However, given the inherently interdependent nature of an SN, a core firm's long-term performance is also contingent upon the performance of other network participants (Tan et al. 2015; Tang et al. 2016). Therefore, the core firms, with their substantial influence across SNs, are expected to initiate and coordinate network-based efforts to navigate broad, complex, and substantial SNDT (Huxham and Vangen 2000).

In pursuit of our research objective, we conduct a case study of Topsun, the largest manufacturer of outdoor leisure equipment in China. The Chinese outdoor equipment manufacturing industry is characterized by high product variety, multi-tiered supplier base that involves hundreds of small to medium-sized factories or workshops. These characteristics result in a highly complex supply network with substantial interdependencies with heterogenous digital capabilities, which mirror the complexity found in existing SN literature (Azadegan and Dooley 2021; Hearnshaw and Wilson 2013), making the context suitable for our research. Moreover, Topsun has successfully enacted DT internally with ongoing, iterative DT processes across the organization. These efforts were spearheaded by a dedicated DT team, which played a pivotal role in directing Topsun's organizational DT. The successful internal DT led by the DT team allowed them to accumulate technical and coordinating experience alongside demonstrable outcomes that are tailored to the outdoor equipment manufacturing industry. Building on internal DT success, DT experience, it developed a centralized digital supplier relationship management (SRM) platform, effectively onboarding and integrating over 200 suppliers that constitute more than 90% of its total procurement to establish shared procedural standards, and an enhanced B2B visibility on the platform. It further led to a growing number of autonomous DT initiatives by Topsun's suppliers were enacted alongside ongoing coaching and support by Topsun. The SRM platform was later extended to the development of a new SN business model, including an emerging SN finance system. Topsun's DT initiatives, particularly the SRM platform, have received numerous accolades, including National Intelligent Manufacturing New Model Demonstration Platform and National Service-Oriented Manufacturing Demonstration Platform. Topsun's observed leading role and success in transforming its complex SN, making the case valuable for unpacking how a core firm builds and enacts inter-organizational DT leadership.

In addressing the aforementioned knowledge gaps, our study enhances the current literature by

providing insights and deriving prescriptions for implementing effective DT at the SN level. Furthermore, this study will introduce and elaborate on the notion of inter-organizational DT leadership, offering an in-depth perspective of the underlying mechanisms for attaining and enacting inter-organizational DT leadership, specifically at the SN level. To this end, a theoretical framework will be developed to shed light on how a core firm's inter-organizational DT leadership can be attained and enacted for effective SNDT. Accordingly, this study aims to address the research question: "*How can a core firm effectively develop and enact inter-organizational leadership for successful SNDT?*"

2.2 Background Literature

Following the grounded theory approach (Glaser 1992; Glaser and Strauss 1967), we entered the field without specific theories in mind beyond our intent (Strong et al. 2014) to explore the DT of supply chains. The theoretical framework developed from our data (see Figure 2) includes supply chain leadership concepts with an established presence in the literature, yet they were integrated into the emerging theory only after being grounded in the data analysis. Consistent with Strong et al. (2014), we now briefly review it with the supply chain digital transformation literature that initially informed the motivation of our study.

2.2.1 Term Use of Supply Network & Supply Chain

As discussed in earlier section, the term supply network (SN) evolved in supply chain management (SCM) to reflect the reality that firms are typically part of multiple, interdependent supply chains with heterogeneous and alternative clients and suppliers (Hearnshaw and Wilson, 2013; Braziotis et al., 2013; Mills et al., 2004). While SN captures the increased complexity and interconnectivity of modern supply structures, existing literature often uses supply chain (SC), supply network, and supply chain network interchangeably. For

this study, we position our work at the SN level but use SC and SN interchangeably when reviewing the literature to acknowledge the prevalent use of SC in extant knowledge.

2.2.2 Digital Transformation of Supply Chains/Networks

Although a number of existing studies have explored the application of digital technologies to optimize SNs, research on SNDT is still in its infancy (see Table 2), as most of them are not focused on DT per se. Instead, they investigate how new technologies could be embedded in conventional SN activities (i.e., digitization) as opposed to planning, coordinating, and imposing transformational changes on SN members and their collaboration (i.e., DT) (e.g., Abdel-Basset et al. 2018; De Vass et al. 2018; Seyedghorban et al. 2020).

Table 2: Studies of SNDT

Paper	Focus	Key Arguments
Abdel-Basset et al. (2018)	Technology	To effectively deal with traditional SC management challenges, such as information of less quality and security concerns, a secure system that integrates RFID tag, reader, neutrosophic Decision Making Trial and Evaluation Laboratory (N-DEMATEL) technique with analytic hierarchy process (AHP). The neutrosophic Decision Making Trial and Evaluation Laboratory (N-DEMATEL) technique.
De Vass et al. (2018)	Technology	By examining the potential role of IoT in SC integration and performance, survey data collected and analysed from 227 Australian retailers show that IoT capability has significant positive effect on the integration of internal-, customer, and supplier related processes that further inform organizational and SC-level performance.
Seyedghorban et al. (2020)	Technology	From a resource-based view, five clusters of technological resources, including RFID, big data, cloud computing, 3DP, and IoT are commonly used to pursue two SC level strategies – digital manufacturing and omni-channel strategies as well as obtaining SC agility for higher SC performance.
Hartley and Sawaya (2019)	SC DT Strategy	SC DT is a steady process that would likely to take years. The participants of a supply chain should firstly identify a supply chain technology visionary who understands and leads the SC DT, then develop a digital technology roadmap at the SC level, utilising one or a mix of the following technologies - robotic process automation

		(RPA), artificial intelligence (AI)/machine learning (ML) and blockchain - then finally gradually update foundational information systems across the SC.
Preindl et al. (2020)	SC DT Strategy	By assessing the impact of Industrial 4.0 and DT on SC level decision making, it is found that SC participants' unwillingness to share far-reaching information with each other and the lack of information sharing interface standards form critical barriers to SC DT. Data-driven decision making, however, is found more and more critical at the SC level, which requires quality and a wider access to data and information throughout the SC.
Faruquee et al. (2021)	Strategic Role of DT in SC	To examine the role of joint problem solving (JPS) in developing SC resilience (SCRES) capabilities, the study assessed the trio role of communication, trust, and DT in the context of JPS and SCRES. Due to the inherent complexity of DT's projected impact on a SC, DT on its own, may lead to negative impact on SC communication, trust, hence JPS. Therefore, organizations should not consider replacing trust with SC DT, but strike a balance between the two.

Beyond these technology-centric studies, only a handful of studies explore DT at the SN level from a strategic perspective. Among these, Hartley and Sawaya (2019) and Preindl et al. (2020) have attempted to propose overarching DT strategies for SNs to realize SNDT. More specifically, Hartley and Sawaya (2019) proposed a three-phase strategy to guide steady SNDT, while Preindl et al. (2020) emphasizing the importance of information sharing and transparency in successful SNDT. In addition, Faruquee et al. (2021) also argues for the importance of SN resilience (i.e., the capabilities that an SN affords to help network participants recover from and prevent the occurrence of disruptions), finding that DT must be operationalized alongside trust and joint problem-solving between partners to achieve this resilience.

2.2.3 Supply Chain Leadership (SCL)

As the complexity of SNs grows rapidly, the locus of competition shifts from individual firms to the entire SN (Gosling et al. 2016), leading to increasing interdependence among SN partners to retain and grow the competitiveness of the SN and its participants. As a result, the rising

interdependence within SNs necessitates inter-organizational leadership to strengthen the connection between SN participants (Maestrini et al. 2017; Mokhtar et al. 2019b).

Supply Chain Leadership (SCL) refers to a leading individual or organization's ability to influence partner organizations within one supply chain to establish and achieve common goals and objectives (Gosling et al. 2016). Existing literature affirms a positive correlation between SCL behaviors and SN performance improvement, driven by factors such as enhanced information exchange (Birasnav et al. 2015), organizational learning (Noruzy et al. 2013), and efficiency (Defee et al. 2010). Consequently, studies on SCL have proliferated, with a growing emphasis on the role of SC leaders in orchestrating activities within and across organizational boundaries to benefit the entire SN (Mokhtar et al. 2019b). This makes SCL theory particularly suitable for our research objective of uncovering how interorganizational-level DT leadership can be developed and enacted for effective SNDT.

SCL, derived from classical leadership theories at the interpersonal level, has evolved to encompass inter-organizational dynamics and characterize a leader's ability to influence their SN partners' actions (Defee et al. 2010). The scholarly efforts on the classical leadership theory tend to explore different SCL types (Sharif and Irani 2012). In particular, transactional and transformational leadership styles received extensive attention due to their perceived generalizability (Mokhtar et al. 2019b). Based on the classical leadership theories, transactional and transformational leadership styles are differentiated by the type of changes a leader aims to implement. That is, transactional leaders approach their relational counterparts (i.e., the followers) to exchange values, whereas transformational leaders tend to unite followers and influence their goals and beliefs by operating "out of deeply held personal value systems that include values such as justice and integrity" (Kuhnert and Lewis 1987, p. 650).

In the context of SCL, existing literature discusses the relationship between SN leaders and followers/partners in SN collective endeavors, which can be categorized based on the following: (1) contingent reward/punishment (Hult et al. 2007) and monitoring/auditing schemes (Birasnav et al. 2015) (transactional); and (2) envisioning, motivation, constant support, and coaching (Mokhtar et al. 2019b; Roman 2017) (transformational). Understanding both SCL styles and the differentiation between them helps in comprehending how SN leaders influence their networks and drive SN performance through distinct leadership approaches.

Overall, our examination of the two sets of literature reveals two gaps in relation to our research question. First, although insightful, the literature on SNDT has not examined the underlying mechanisms through which DT can be realized at the SN level. An understanding of this perspective is crucial because the increasing market complexity presents challenges beyond the boundaries of individual firms, to the entire SN to maintain agility and competitiveness (Faruquee et al. 2021; Ma et al. 2020). Therefore, "integrated yet flexible" digital operations across SNs are becoming increasingly significant for traditional product firms to remain competitive (Gimpel et al. 2018, p. 3), which requires scholarly attention to a comprehensive exploration of SNDT to optimize the strategic alignment between technology and businesses across SN participants (Li et al. 2018).

Second, SNDT does not occur organically but requires careful strategic planning and substantial inter-organizational collaboration (Hartley and Sawaya 2019). The growing interdependence and complexity within SN underscore the necessity for inter-organizational leadership to foster stronger connections and collaboration among SN participants (Maestrini et al. 2017; Mokhtar et al. 2019b) and to drive overall SN performance improvement (Sharif and Irani 2012). Nevertheless, despite being rich, my review of the existing SCL literature reveals little to no explicit examination of SLC in the context of DT. Exploring inter-

organizational leadership is important for effective SNDT, given the large-scale SN investments required and the transformative re-alignment of inter-organizational business strategies and processes through the implementation of various digital technologies (Sharif and Irani 2012; Van Veldhoven and Vanthienen 2022).

2.3 Research Method

Our study is conducted using the case research method for two reasons. First, its strength lies in exploring "how" questions (Walsham 1995a) and examining processes (Orlikowski and Baroudi 1991), and this study attempts to understand "how" inter-organizational DT leadership can be attained and executed effectively by a core firm for successful SNDT (i.e., a process). Second, a case study is useful for exploring a multi-faceted and understudied phenomenon that is inextricable from its natural context (Siggelkow 2007). Inter-organizational DT leadership encompasses social, technological, and business dimensions (Hartley and Sawaya 2019; Yuen and Thai 2017), contributing to the inherent multidimensional complexity of the phenomenon, which poses challenges for objective research approaches. As such, it may be more appropriate to examine the phenomenon by interpreting the shared understanding of the relevant stakeholders (Klein and Myers 1999).

To address our research question, two case selection criteria were identified. First, the case organization should function as a core firm within its SN, enabling it to exert influence over its network partners (Mizruchi and Yoo 2017) in alignment with our research focus on inter-organizational DT leadership. Second, the organization must have effectively utilized this influence to lead SNDT effectively. Adopting theoretical sampling (Glaser and Strauss 2017), the Topsun case was selected as it suits our study especially well in relation to both criteria: (1) Topsun's prominent industry position grants the firm substantial influence within its SN, and (2) Topsun has led its network of suppliers and business partners in DT, who have been successfully initiated and/or implemented DT initiatives internally based on the requirements

and standards imposed by Topsun, as well as proactively seeking for Topsun's ongoing support for ongoing internal DT and SN integration.

2.3.1 Case Background

Established in 1991 and headquartered in Hangzhou, China, the Topsun Group is a prominent multinational corporation specializing in outdoor leisure products, with nearly 7,000 employees spanning China, the United States, and Europe. Topsun distributes to over 60 countries through partners like Walmart, Costco, and Decathlon. With 70% of production of semi-finished or finished goods outsourced to thousands of suppliers (30% produced in house), Topsun's supply network exhibits significant complexity, further reinforced by its market leadership and influence over supply chain partners, making it a compelling case for this study.

Topsun's strategic DT vision emerged in response to escalating business demands and the 2008 global recession. From 2013, its IT team evolved into a DT-focused unit, integrating IT expertise with business acumen. In-house development of technologies such as robotic automation, big data systems, manufacturing execution systems (MES), and supplier relationship management systems (SRMS) enabled comprehensive DT across Topsun's operations from manufacturing to executive levels by 2018. By 2022, the DT team expanded to over 80 members.

Building on this success, Topsun extended its DT efforts to the SN in 2019. A key initiative was Outsideasy, a cloud-based platform integrating SRMS to standardize procurement interactions with Topsun's SN partners. By September 2023, Outsideasy onboarded over 200 suppliers, representing more than 90% of Topsun's purchase share with an annual transactional value of 2–3 billion CNY. The platform streamlined SN procurement activities, including supplier qualification, bidding, and collaboration, ensuring transparency, consistency, and quality. Additionally, in-house developed systems such as a supplier virtual factory system, an

SN logistics management system, and trading platforms targeting diverse customers (see *Figure 1*) were implemented to integrate critical connecting nodes of SN activities, such as inventory tracking, into Outsideasy. Such integration enabled the traditional SN physical procurement activities to be digitalized as transparent and standard processes on Outsideasy, avoiding lagged responses, investigations, and reprocessing along the SN collaboration processes.

Beyond procurement and manufacturing, Outsideasy enabled the transformation of Topsun's SN interactions to a broader range of services, including Platform-as-a-Service (PaaS) for Topsun's SN partners. This allows Topsun's DT team to develop customized systems based on the SN partners' needs, enabling real-time operational integration and collaboration of the SNs. Additionally, qualified suppliers can access short-term loans based on trading profiles without additional collateral. Moreover, Outsideasy also served as a business-to-business (B2B) connecting platform for suppliers and distributors that had onboarded. These innovations have enhanced SN transparency, collaboration, and overall performance. *Figure 1* presents a timeline detailing Topsun's major initiatives throughout its DT journey.

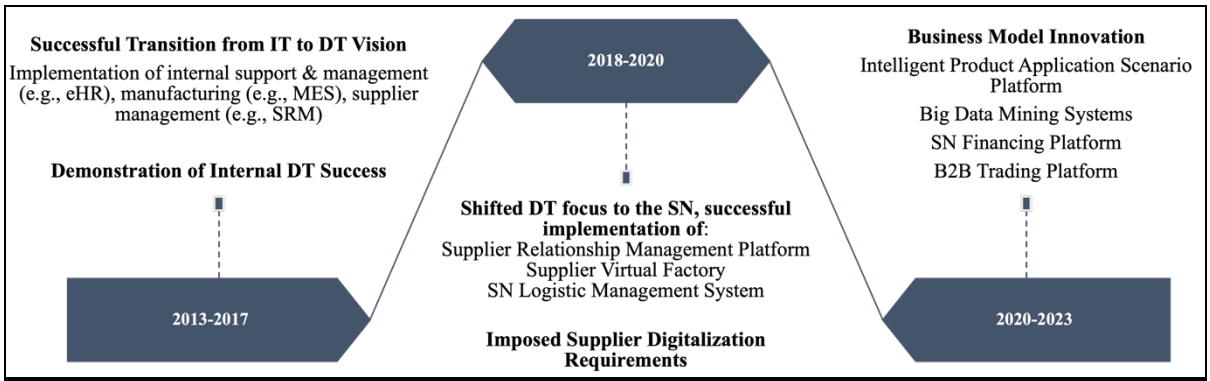

Figure 1. Timeline of Topsun's DT Journey

Case access was granted in December 2018. Semi-structured interviews formed the primary source of data (Myers and Newman 2007; Walsham 1995a), involving a total of 19 informants who participated in 21 formal and 4 informal interviews conducted either face-to-face or online

(see *Table 10 in Appendix A* for the full interview schedule). These interviews were conducted over five rounds of data collection from January 2019 to September 2023 to account for the longitudinal changes in Topsun's internal and SN-wide DT initiatives and impact (Hermanowicz 2013).

As discussed in the case background, Topsun's internal DT success was first achieved in 2018, when its DT vision was then extended to its entire SN. Since 2018, a range of DT initiatives have been implemented and evolved, involving the collaboration of its SN partners. Therefore, four additional rounds of interviews were conducted (in 2020, 2021, 2022, & 2023) after the initial interviews in 2019 with key informants from Topsun and its SN partners to understand the developmental changes of Topsun's DT initiatives (Hermanowicz 2013) and to ensure there was no apparent discordance between Topsun's claimed SNDT vision and the actual SNDT outcomes they have achieved (Thomson 2007).

Besides, individual and focus group interviews were used in combination to enhance the richness of interpretation of the phenomenon being investigated (i.e., SNDT) and the trustworthiness of our subsequent findings compared to using either approach in isolation (Lambert and Loiselle 2008; Michel 1999). The longitudinal nature of our study, which involved multiple rounds of data collection, allowed for iterative validation and exploration of data from individual accounts to further strengthen the initial model (Lambert and Loiselle 2008). The use of informal interviews also allowed data to flow "from the immediate context" (Berry 1999, p. 2), adding context and authenticity to data (Swain and Spire 2020).

Of the 19 informants, 13 were members of Topsun's top management, IT department, and various business units (refer to *Table 8, Appendix A*). The informants were selected based on two criteria. First, their roles as key decision-makers or members of a specific stakeholder group during the relevant periods of interest are to ensure their capability to provide

comprehensive and firsthand descriptions of the DT process both within the organization and at the SN level (Tan et al. 2020). Second, since we lacked sufficient inside information to identify informants independently as researchers, chain referral sampling (Biernacki and Waldorf 1981) was also used for informant selection, through which the correct informants were identified by key members of Topsun's DT team (e.g., CDO and Deputy Head of IT; Pan and Tan 2011).

To ensure a comprehensive understanding of the DT initiatives and outcomes at the SN level, six informants representing Topsun's SN partners were also identified via chain referral sampling based on our designed interview themes (see *Table 8, Appendix A*). Based on insights from key members of Topsun's DT team, suppliers were identified as the most closely integrated SN partners, actively participating in Topsun-led SNDT initiatives since 2018, including system integration and on-site hardware upgrades. Including informants from Topsun's SN partners allowed "a variety of voices" (Myers and Newman 2007, p. 22) to be represented, not only within the core firm but also at the SN level, to align with our research purpose of (Tongco 2007) how a core firm develops and executes inter-organizational DT leadership to enact successful SNDT. This approach allowed us to validate the information acquired from internal stakeholders and enabled triangulation and the integration of diverse perspectives.

In addition, the "nontechnical" literature (Strauss and Corbin 1998, p. 52) from various sources, including webpages, static corporate presentation slides, unpublished internal reports, and other published materials, served as our secondary data to (1) gain an overview of the case study (e.g., see *Figure 1*), (2) form the basis for our initial interview protocol (see *Table 9, Appendix A*), and (3) minimize the potential occurrence of retrospective rationalization among our informants to enhance data validity (Glick et al. 1990).

The interviews were averaged 94 minutes in length (excluding the informal ones). The earliest interviews focused on acquiring a broad overview of the phenomenon (Pan and Tan 2011) and unveiled the primary stages of Topsun's DT enactment described in the case background. The protocol for field interviews included open-ended questions that allowed informants to describe their roles in internal and SN-level DT across different stages (see *Table 9, Appendix A* for examples). More specifically, each guide had a standard list of open-ended questions to facilitate disclosure of additional details and obtain richer context as informants built on their responses (Galletta and Cross 2013). These open-ended questions centred on various aspects of Topsun's in-house DT initiatives, its vision of SNDT, its role and involvement in the SN, as well as its partners' role and involvement. Role-specific questions were also tailored to the different informants (Myers and Newman 2007). For instance, Topsun's CDO was asked about the organization's overarching DT vision, given his pivotal role in its development. This semi-structured approach to interviewing is less rigid than an explanatory case study that simply seeks to validate pre-formulated hypotheses (Ferlie et al. 2005) and balances the generative nature of pure induction with the pragmatism of early structure (Langley 1999). All interviews were digitally recorded, transcribed, and collated to ensure data accuracy and completeness (Walsham 1995a).

2.3.3 Data Analysis

Data analysis was performed simultaneously with data collection to leverage the flexibility of the case research method fully (Eisenhardt 1989; Strauss and Corbin 1998). Following the broad overview of the phenomenon obtained from the initial interviews, we employed the temporal bracketing approach (Langley 1999) to categorize the events, activities, and decisions that unfolded at Topsun and its SN with the delineation of the four stages concerning the attainment and execution of inter-organizational DT leadership (i.e., *strategizing DT with an SN-vision, exemplifying internally to accumulate leadership credibility, rallying advocates for*

DT at the SN level, before assembling all SN participants to implement DT initiatives with SN business model innovation). The temporal bracketing approach was employed to conceptually delineate four stages characterizing the unfolding DT process within each stage and establish a coherent framework and a referential structure to systematically arrange the ensuing gathered data (see Figure 1; Langley 1999). Furthermore, a detailed narrative and several visual maps that outlined our interpretations of Topsun's DT initiatives were generated to summarize the massive amount of data into a more manageable and organized form. The narrative and visual maps were then compared with the relevant literature to shape our emergent theory (Walsham 1995a).

The organized interview data were then coded with a mix of open, selective, and theoretical coding (see Glaser 1992). In particular, open coding was first used to extract first-order concepts from the excerpts of our interviews (Van Maanen 1979). Two researchers met after each interview for the first round of data collection and reviewed emerging codes to ensure intercoder reliability (Cheung and Tai 2023; Strong et al. 2014). Once the consistency was established, the lead researcher, who was present at all interviews across the five rounds of data collection, proceeded to code each interview to ensure a nuanced understanding of the data. Emerging first-order concepts were documented (e.g., *Scaling Struggles in Operations, Prioritising Cost-Efficient Solutions for Initial Acceptance, Minimize Operational Disruption, Unleashing Market Influence*) through analytical memos to support later theorization.

Once the theoretical saturation (Strong et al. 2014) was reached, when first-order concepts were not emerging, and no additional data could be collected to improve our inductively derived theory (Eisenhardt 1989), we started axial coding to group these first-order concepts into second-order themes. These themes emerged as the relationships among the first-order concepts were identified. For instance, the theme Strategic Pilot Site Selection included the selection strategy of Topsun's DT team – the selection must prioritize the site's alignment with

Topsun's strategic objective (i.e., *Strategic Objective-Centric Selection*) and should prioritize the sites with higher readiness in terms of willingness (i.e., *Prioritising based on DT Readiness*).

Next, we conducted selective coding to identify theoretical patterns by systematically comparing passages with similar codes across multiple interviews. In this way, the second-order themes were abstracted to aggregate conceptual dimensions (Gioia et al. 2013). During the process, to assess how the emerging themes and dimensions related to the literature (Strong et al. 2014), we also examined the relevant literature. A data structure that captures all the supporting empirical evidence, as well as all the eventual first-order concepts, second-order themes, and aggregate dimensions of our developed theory, is presented in *Table 3* below and *Table 11* in *Appendix A* to illustrate this coding process.

Table 3: Data Structure for Study 1

1st Order Concepts	2nd Order Themes	Aggregate Dimensions
Scaling Struggles in Operations	Identify Adaptive Requirements	Strategizing
Navigating Economic Uncertainty		
Push for Lean Management & Standardization	Formalize DT Objectives	
Efforts towards Integration		
Strategic Role Evolution	Acquire DT Resources	
Strategic Alignment of DT Team		
Connected Development of DT Vision	DT Vision & Strategy Formalization	
Strategic Vision for Lean Supply Chain		
Strategic Objective-Centric Selection	Strategic Pilot Site Selection	Exemplifying
Prioritising based on DT Readiness		
Need for Speedy Implementation	Pilot Implementation	
Efficient Production Line Management with MES		
Subtle Trial & Success	Demonstrate Successful Outcomes	
Prioritising Cost-Efficient Solutions for Initial Acceptance		
Translating Internal Experience to Shape Industry Standards	DT Leadership Credibility	
Recognition of Experience and Capability		
Selective Collaboration Based on Transaction Frequency	Identify Advocacy Entry Points	Rallying
Core Partner-First Selection		
Prioritizing Essential Integration	Define SN Value-driven Integrative Digital Standards	
Minimize Operational Disruption		

Transparent Information Exchange	Platformization of SRMS	
Informed Decision Collaboration		
SN Partner-Perceived Benefits of DT	Shared SNDT Vision & Buy-in	
SN Partner Awareness of Planning Consequences		
Supplier-driven DT Collaboration	Proactive SNDT Rollout	Assembling
Proactive DT Vision of SN Partners		
Unleashing Market Influence	Sustain Incentive-based DT Enactment	
Mandated Onboarding		
Adapting IT Solutions to Supplier Capacities	Tailored Technical Support	
Usage-Pattern-Driven Iterations & Tailoring		
Leveraging Industry-specific Expertise		
Responsive Guidance & Mentorship	Continuous Coaching	
Timely Issue Resolution		
Credit-Linked Lending System	Platform-based Financial Services	
Platform-based Risk Control		
Service Reconfiguration for B2B Connection	Platform-driven Visibility	
Outcome-Oriented Platform Design		

Our theory was depicted in a series of sketches as it underwent various iterations of development, which, together with the codes, themes, narrative, and visual maps, were verified with our informants. The use of these techniques entailed a highly iterative approach, we kept moving back and forth between empirical data, including confirming with later interviewees, the relevant literature, understanding across the research team, and the developing framework (Eisenhardt 1989).

2.4 Findings

Analyses of our data suggest that to inter-organizational DT leadership held and enacted by a SN core firm takes a crucial role in realizing effective SNDT, which in turn, allows the entire SN and its participants to remain competitive and respond effectively to the growingly dynamic market. Specifically, our data revealed that the process of attaining and enacting inter-organizational DT leadership for effective SNDT involved four stages (i.e., Strategizing, Exemplifying, Rallying, and Assembling), as will be elaborated on in the following subsections.

Mechanism 1: Strategizing

Strategizing refers to the mechanism through which the core firm clearly defines and communicates the goals and strategic importance of DT to all internal stakeholders, fostering a long-term vision of shaping SNDT to establish a coherent understanding and commitment to the organization's DT objectives. In the early stage of establishing the DT objectives, Topsun identified the need for strategic changes due to rapid internal growth and external disruptions. First, it saw the significance of transforming following a substantial exponential expansion in its business scale, which necessitated the organization to find new ways of meeting escalating demands efficiently. As its COO illustrated:

> "*To produce at such a large scale without information technology for management…is impractical…When we reached a scale of around 250 million, relying on Excel was no longer possible…*"

Moreover, the Global Financial Crisis of 2008 significantly reshaped the macroeconomic landscape and prompted Topsun to recognize the increasing importance of SN-based competition over a heavy reliance on internal production. The COO continued with the illustration:

> "*After 2009, it became clear that it was no longer favorable to invest heavily in fixed assets, or build many factories... As a result, we adjusted our operational strategies and transitioned our supply chain strategies…gradually shifted to focusing primarily on outsourcing... our digitalization must rely on top-level design,… and integrate with our supply chain.*"

As a result, Topsun **identified adaptive requirements** for DT to ensure strategic alignment with its evolving operational scale and the SN dynamics from the outset. These requirements were pivotal in fostering long-term organizational and SN resilience, adaptability to rapid environmental changes, and guiding future DT initiatives. Additionally, they facilitated

awareness and recognition of impending strategic shifts across business units (BUs) and the broader SN, enabling a cohesive and effective initiation of DT efforts (Albukhitan 2020; Matt et al. 2015).

Under the adaptive requirements of DT, it was essential for the core firm to **acquire DT resources** to manage its DT initiatives (Frankiewicz and Chamorro-Premuzic 2020). Topsun deliberately distinguished DT competencies from conventional IT skills, which primarily focus on technology operation and maintenance tasks. Instead, the desired DT talents were expected to strategically assess the DT framework and contribute to decision-making processes (Gilch and Sieweke 2021), thereby enabling Topsun to pursue its long-term DT vision, which extends to and integrates the SN level. In 2014, Topsun appointed a Chief Digital Officer (CDO) to establish and oversee its DT team. The CDO played a pivotal role as a DT visionary who bridged the organization's traditional practices with the transformative requirements of DT initiatives (Tumbas and Berente 2018). The CDO redefined the attributes sought in DT talent, emphasizing the transition from traditional IT roles to strategic stewards. As the CDO explained:

> "*Digital transformation fundamentally relies on IT talent. Their role has completely evolved from babysitters to stewards who engage meaningfully with the top management about the business model. Traditionally, IT personnel were fix-it folks for issues like unlit network cables…Our team…the primary focus is on software development, product management, and business model innovation*."

This reorientation of DT resources reinforced Topsun's ability to align its DT initiatives with its adaptive strategy, driving business model innovation while ensuring the transformation extended beyond the organization to influence and integrate its broader SN (Gilch and Sieweke 2021).

Subsequently, the DT team collaborated with Topsun's strategic planning team to **formalize DT objectives** aimed at process integration by addressing the identified adaptive requirements. To do so, Topsun set two primary DT objectives of achieving *integrated smart production* and *lean management*. These two objectives are integral to ensuring Topsun's DT initiatives align with its DT vision. Our data revealed that for traditional product firms like Topsun, the realization of lean management served as the foundation for the implementation of further DT initiatives. As Topsun's COO emphasized:

> "*If lean management isn't implemented effectively on the floor, there won't be a solid foundation for advancing information systems…Lean practices include standardization…including standardized procedures, workflows, and operational guidelines.*"

Building on this foundation, Topsun aimed to integrate the various systems along the manufacturing processes that spanned across different BUs and its SN to optimize efficiency. The COO elaborated:

> "*We integrated the PLM across different BUs, and with our supply chain CIM, then connected the MES,…to achieve real-time cost data for each production line…All costs must be broken down and assigned to individual lines…for products…the system should provide me with precise cost data for every single product by the time my product rolls off the line…Based on this vision, we are continuously integrating and refining modules to achieve seamless connectivity.*"

As a result, Topsun formalized a DT vision and strategy extending from its internal operations to its SN, ensuring long-term alignment and leadership in driving SNDT initiatives.

Mechanism 2: Exemplifying

To align with the established DT strategy and the long-term vision of SNDT, Topsun first needed to implement DT initiatives internally to gain practical DT experience and demonstrate

successful DT outcomes for broader SNDT implementation. The **exemplifying** mechanism required the core firm to integrate its unstandardized business processes through DT, thereby establishing credibility as a DT leader of its SN partners. In particular, Topsun's large-scale operations, encompassing various divisions and modules, posed significant challenges for simultaneously executing a comprehensive DT across the entire organization. Besides, its entrenched sales-centric organizational philosophy, rooted in its inception, resulted in considerable inertia and skepticism within the long-established divisions. As Topsun's Deputy Head of IT explained:

> "*Implementations were extremely challenging [due to] the numerous business units and factors. Coordinating with independent BU leaders was difficult…*"

The interconnected, complex business processes across the core firm, and the incumbent beliefs, diverse interests, and organizational culture across BUs, also portrayed the complexity and challenges likely to be encountered in effective SNDT execution. By addressing these challenges, Topsun not only accumulated compelling DT outcomes but also gained valuable managerial experience in navigating the complexities of large-scale DT. This dual achievement bolstered its credibility as a DT leader in guiding SNDT for its SN partners.

To proactively manage anticipated resistance and diverse interest to changes brought by DT, it was essential for the DT team to conduct a **strategic pilot site selection**. This decision was grounded in two primary criteria: alignment with Topsun's urgent business needs to ensure consistency with its strategic plan and the anticipated level of willingness to minimize risks of failure due to behavioral factors. The Deputy Head of IT continued to outline their strategies for selecting pilot sites:

> "*One way to address this challenge is to convene immediate discussions with the top management to align plans with strategic goals…For skeptics,…, we prioritize working with those more open to change initially.*"

This is crucial as the early success holds the potential to function as a benchmark to shift the "objective reality" that various stakeholders "want to believe" and foster broader organizational buy-in (Anderson and Anderson 2010, p. 166). Conversely, failure in this regard could exacerbate the existing level of resistance and undermine the broader DT effort (Pan et al. 2008).

Following the strategic pilot selection, Topsun started the **pilot implementation** by launching a series of DT initiatives targeting integrated smart production and lean management. These pilot sites were designed to serve as demonstrable success cases, showcasing scalable best digital practices in product firms. The DT initiatives focused on standardization and digitalization of data and procedures through a suite of progressively integrated management, manufacturing planning, and execution systems (see *Figure 1*). These systems served as the means of gradually achieving the requirements of integrated smart production and lean management. Product Manager A provided some successful pilot implementation examples in detail:

> "*Extracting data from production is crucial for use. Our MES integrates with the ERP system for real-time orders and production tasks. Using MES with on-site elements like hanging lines…and production line data, we effectively collect and track production data for real-time analysis…systems like hanging lines have been implemented in [multiple named internal factories].*"

Such implementation disseminates from the core production module to other functional areas such as warehousing, planning, and procurement. By interlinking these areas, Topsun accumulated demonstratable outcomes of how lean, smart, and integrated DT initiatives could bring transformative efficiency across various BUs and divisions of the organization.

The DT team then had to **demonstrate successful outcomes** from pilot implementations to catalyze wider DT across the organization. Their CDO highlighted the importance of this approach:

> "*We believed in our DT initiatives, but skeptics remained… In such situations, we quietly implemented the initiatives elsewhere and achieved success. Then these successful outcomes became our benchmarks…the objections from other BUs were eliminated organically.*"

Demonstrating tangible successes addresses skepticism and resistance - common barriers to DT adoption - by showcasing how DT-enabled standardization and integration simplify complex and labor-intensive business processes and routine tasks. This incremental diffusion of DT initiatives mitigated stakeholder skepticism and resistance, which fostered a cohesive organizational value in support DT, enabling alignment across different BUs and divisions.

The exemplifying mechanism unfolded iteratively and incrementally, with ongoing user feedback for the DT team. The Deputy Head of IT characterized this approach as "*running in small, quick steps."* This DT implementation process iterated at Topsun until DT initiatives were diffused throughout the firm. As such, the DT team not only gained expertise in incrementally leading internal DT efforts but also cultivated an intrinsic motivation among internal stakeholders to proactively engage in ongoing organizational DT (Tremblay et al. 2009). The Procurement Manager stated:

> "*Our DT team … follow detailed quarter and annual work plans to gather, organize, and synthesize our requirements, identifying [prospective DT] projects accordingly…Now everyone is eager to improve efficiency through digital means. Even a security room may have DT needs. 'Why not simplify operations?' This mindset has deeply permeated Topsun."*

This iterative and incremental approach of pilot site selection, implementation, and showcasing successful outcomes enabled Topsun and its DT team to build leadership legitimacy consisting of motivation, expertise, and proven success to guide its SN partners for effective SNDT.

Mechanism 3: Rallying

In addition to internalizing and exemplifying DT internally at the core-firm level, Topsun had recognized the significance of managing the interdependencies across the SN when establishing its DT vision at the strategizing stage. To achieve this, the third mechanism is **rallying** to win advocates for DT at the SN level, which involved leveraging the leadership legitimacy Topsun accumulated through its DT successes to its core SN partners. This entailed showcasing its own DT initiatives, promoting their outcomes and expertise to SN partners, and mobilizing these partners to undertake and implement their own DT initiatives to accumulate SNDT advocates outside the core firm and foster greater SN integration and standardization.

To achieve this, Topsun first leveraged its internal pilot site selection experience (i.e., through prioritizing sites of strategic urgency and higher willingness to DT) to **identify advocacy entry points**. That is, Topsun initiated the SNDT advocacy with SN partners that were characterized by the highest levels of strategic and operational interdependence, as these partners were also more likely to collaborate due to direct incentives of transacting with the core firm. Topsun's Deputy Head of IT explained:

> *"In the earlier stages of defining and promoting relevant standards, we had to approach the core business partners first. Without close integration with these key businesses, or if they don't even do business with us, they wouldn't be interested in our advocacy."*

Product Manager B added more details:

> "*When discussing our collaborative platform with suppliers, our initial push was on the core suppliers due to our business integration. Our collaboration*

needs to be very frequent and intense, with deep cooperation. For one-time transaction suppliers, we don't set up such a requirement as it could be costly and challenging for them."

Next, based on its internal DT experience, Topsun identified standardization and integration as critical prerequisites for successful SNDT. Thus, it first had to **define SN Value-driven integrative digital standards** in collaboration with its core SN partners to establish procedural consistency across the network. However, Topsun acknowledged the challenge that most of their SN partners were SMEs with varying levels of DT readiness. Thus, to trigger effective SNDT, Topsun set the focus on the most critical SN integration nodes and prioritized cost efficiency. The Deputy Head of IT emphasized the challenge, noting:

"Since there are too many SMEs…many often have a very low level of digitalization...what we focus on is the most essential aspect – managing inventory entry."

Moreover, Product Manager B highlighted the importance of minimizing operational disruptions and cost burdens when advocating for new systems, especially given the significant variation in IT infrastructure and management capabilities among core SN partners:

"*It is essential that their actual practices can align with our system in such a way that the impact on their operations is minimized. Minimizing changes is critical because any modification comes with costs. For example, asking them to add a staff member for scanning introduces additional labor costs, which may eventually be passed on to us.*"

Specifically, to initiate SNDT, Topsun initially widely advocated the use of RFID systems, which enabled real-time inventory tracking with relatively low technical and financial requirements (Bhattacharyya et al. 2010). RFID systems also delivered immediate cost benefits while streamlining critical SN integration, which sparked SN participants' interests in further

DT and SNDT initiatives. The IS manager of Topsun's Supplier A reported significant benefits and their intention to advocate similar practices within the SN:

> "*Manual errors in packing and labeling… have decreased significantly…The inventory backlog has also been reduced significantly…from over 10,000 meters per month to 1-2,000 meters. a substantial decrease… It makes our cost control easier and reduces waste greatly…*"

Similarly, the Business Manager of Topsun's Supplier B also indicated:

> "*Receiving stock is much faster now. When without the barcode [RFID] on the items, we had to manually open each package to do the counting…now the truck simply passes the Dragon [scanner] gate…it could take several hours to process a truck of stock before. Now it only takes about ten minutes.*"

Defining and advocating SN Value-driven integrative digital standards played a pivotal role in disseminating awareness of and benefits from effective SNDT initiatives. These efforts further empowered Topsun's cloud-based initiatives, particularly via the **platformization of SRMS**. Platformization of SRMS involved integrating Topsun's internal SRM systems and data collected from Topsun's SN partners into an interactive, cloud-based platform, Outsideasy, that was accessible by all verified SN participants. The platformization not only supported the fostering of standardization across the SN but also enabled real-time, transparent communication, boosting efficiency and accountability, hence the advocacy of SNDT by Topsun's SN partners. Topsun's Manager of the Supplier Chain Operations Center provided an example of standardization of the manufacturing processes based on the platform:

> *"Our in-house data, workflows, and processes are very standardized…for every product…For the outsourcing ones, we used to send someone onsite to teach the frontline workers….And this person would be the only one who knows all the details and standards [in an outsourcing factory]…Now with the cloud-*

based MES implemented, all standard videos, process files…are accessible by our outsourcing partners……the key is that all the data has been fully standardized."

The cloud-based platform also enabled real-time, transparent interactions across the SN, which fostered heightened efficiency. As delineated by the Procurement Manager:

"*Our interaction with suppliers is now in real-time online, facilitating order confirmation, acceptance, and delivery schedules updates…Such information becomes transparent to all parties involved ... which significantly reduces information flow.*"

The platform's integration of diverse data sources further enhanced the application of digital standards across the SN. Business Manager of Topsun's Supplier B confirmed these benefits:

"*Another benefit is on delivery… It makes checking for discrepancies in monthly reconciliation easier compared to… the past hassle of searching for papers and asking others for help. Everything is now stored on the platform...*"

This transparency cultivates accountability in SN activities (Lourenço 2015), as evidenced by Topsun's Product Manager B:

"*Previously,…our procurement people might cancel it [an order] mid-production, then needed it again later… With the new system,… there would be a reminder to reconsider cancellations carefully…locking decisions internally… this improves accuracy and reduces waste, forcing our team to plan more cautiously."*

This heightened accountability and platform-based governance in SN collaboration promotes increased trust among SN partners (Panahifar et al. 2018), which is crucial for the success of SN collaboration and winning advocacy for effective SNDT initiatives.

The rallying process continued iteratively to identify additional core SN partners as advocates

who also gradually joined complying with the digital standards set by Topsun and onboarding Outsideasy for SN collaborations. Meanwhile, the exemplifying mechanism operated partially in parallel, showcasing a broader range of DT initiatives that were successful in the core firm, and extending these exemplars to its SN partners ongoingly. Topsun's CDO emphasized the importance of exemplification in executing leadership at the SN level:

> "*As a leading enterprise, we must lead the way…It's about setting an example. For instance, in our bag factory [the first successful internal pilot site]…one of our managers there has transitioned to the sales department to oversee our outsourced factories, and provide them with lean guidance*."

This dual strategy of exemplifying and rallying was essential for the obtaining a shared SNDT vision and buy-in from Topsun's core SN partners, laying a solid foundation to likely trigger a snowball effect across the SN for comprehensive SNDT (Defee et al. 2010).

Mechanism 4: Assembling

The DT initiatives implemented internally by Topsun provided the firm with vital implementation experience, demonstrable outcomes, and legitimacy that contributed to its readiness to lead complex SNDT. Simultaneously, Topsun's external communication of its DT strategy and vision demonstrated its commitment to facilitating extensive SNDT, raised awareness, and mobilized its core SN partners for collaboration. Consequently, Topsun was now prepared to lead the SN implementation of DT initiatives (i.e., by "assembling" its network partners for SNDT). The **assembling** mechanism enabled the core firm and its SN partners to implement DT collaboratively, fostering strengthened connectivity and new business models across the SN. The core firm also accelerated its inter-organizational DT leadership by enabling effective SNDT initiation. Such implementation and assembly of DT initiatives are not solely coercive directives imposed by the core firm but largely consist of organic initiatives driven by

SN participants to ensure the coherence and synergy of SNDT implementations (Faruquee et al. 2021)Faruquee, 2021 #597}.

At this stage, the interactive integration of all SN participants was essential. This collaborative process involved all SN participants actively engaging in DT initiative continuous communication, feedback, coaching, and iterative improvements facilitated by Topsun. To this end, the core SN partners that were rallied as advocates of SNDT previously, initiated **proactive DT rollout** by actively learning and implementing the DT initiatives and standards set by the core firm, extending the scope of SNDT to their immediate partners. The IS manager of Topsun's Supplier A illustrated:

> "*With this system, it's much quicker and benefits everyone … most importantly, it saves significant costs. We know that Topsun has dragon gates installed [a scanner gate], she [the general manager] is also negotiating for one now…Our top management also found this [use of RFID systems] very helpful with our on-site management, and we are now working on setting relevant requirements for our clients.*"

The Business Manager of Topsun's Supplier A also shared an example:

> "*We are also willing to take the lead and share our experience with our upstream and downstream partners…For example, there was a client recently asked about the systems we're using, the Dragon Gate…if they are effective, and how they work…We had a discussion with them."*

Similarly, Supplier B's CEO underscored their alignment with Topsun's SNDT direction:

> "*So far. We have been following their [Topsun's] footsteps…but we are also asking our suppliers to move in this direction with us…we are very willing to*

pass on all the good ideas and concepts Topsun shared with us, and see if it works so our cooperation could be more efficient."

Meanwhile, Topsun had to **sustain incentive-based DT enactment** by onboarding more periphery SN partners as a condition for transacting with Topsun. The Deputy Head of IT explained:

"*Because we are the largest order source. Initially, they may not grasp it, but cooperation is necessary… It's human nature to be reluctant to change… However, someone needs to push for change eventually. Our primary driver for pushing change is our transaction-based business model.*"

Topsun's Procurement Manager further highlighted the results:

"*All 225 suppliers that account for 90% of our procurement share have been successfully integrated into our Outsideasy platform. While some initially expressed resistance, they ultimately had to adapt, as non-compliance would result in losing orders from us.*"

Nevertheless, Topsun acknowledged the limitations of a purely transactional approach, as noted by its Deputy Head of IT:

"*When implementing new technologies or methods, management is crucial… but forcefully imposing standards on partners can lead to issues…we must find ways to guide them effectively*."

This understanding led Topsun to adopt a balanced approach. That is, both the incentive-based enactment and proactive SNDT rollout by its core partners were reinforced through **tailored technical support** and **continuous coaching**. These efforts, guided by SN partners' feedback and inquiries, ensured sustained engagement and iterative improvement in SNDT implementation, fostering trust and commitment in SNDT within the SN (Lockström et al.

2010; Mokhtar et al. 2019b). Supplier B's CEO emphasized the value of Topsun's tailored approach:

> *"Topsun is not a tech company but a traditional manufacturer. However, the level of accuracy in what they've created, including all the aspects involved, is more advanced and refined than many typical tech companies… They've planned everything in a comprehensive and one-step manner based on our own needs and our operational scale…a fundamentally different starting point."*

"It's tailored for us," added its Business Manager.

More specifically, Topsun's Manager of the Supplier Chain Operations Center elaborated on the rationale for tailoring DT solutions:

> "*It [tailoring] depends on their management model…the level of IT integration…their level of dependence on us and demand…their IT capabilities may not be very advanced, or their equipment may not be as state-of-the-art…personnel quality issues...cost considerations… we tailor solutions based on the specific circumstances of each supplier. We provide simplified or reduced versions of the solutions. While the overall framework and process remain the same… supporting their initial management setup accordingly.*"

In addition, Topsun's continuous coaching played a pivotal role in building DT capabilities across the SN. The Business Manager of Supplier A illustrated Topsun's ongoing and interactive coaching with examples:

> "*Whenever we have specific inquiries, they [Topsun] guide us promptly without hesitation…When first adopted the Dragon Gate, we had many questions... We frequently reached out to their team for instructions and held numerous video meetings on it… They served as mentors to help us navigate these processes*."

Through proactive rollout, effective onboarding, and tailored, continuous support, Topsun's leading strategies enabled its partners to develop the necessary capabilities for effective SNDT initiation (Li et al. 2018), which ensured sustained platform-based collaboration.

In addition, Topsun also played a crucial role in fostering SNDT via innovative, platform-enabled business models via Outsideasy. On the one hand, recognizing the critical need for financial support in supporting SNDT, Topsun utilized integrated platform data to offer **platform-based financial services**, particularly microloans, to its SN partners as a rapid financing solution. Specifically, Topsun leveraged its extensive business scale and established trading relations, thereby ensuring a low-risk and sustainable loaning cycle. As Topsun's CDO explained:

> "*During payment terms for suppliers, they may lack enough funds for ongoing operation…Our licensed financial teams provide loans to them using inventory accounts receivable as collateral. We've innovated this model, providing annual loans totaling 4 billion to suppliers and generating additional revenue through digital transactions on Outsideasy."*

The R&D Manager of Topsun elaborated on the SN finance system:

> "*…Another aspect is our supply chain finance system on Outsideasy. Our suppliers often need financing, and we have a lending system… linked to our database for credit checks. For example, if we owe them 1 million, they can borrow… 700,000 or 800,000. We provide these services to some SMEs to strengthen our collaboration with suppliers."*

Additionally, The Deputy Head of IT highlighted the platform-based risk control mechanisms underpinning these financial services:

> "*It's not only about online processing of contracts, we also enabled a third-party certification process…In the event of disputes or lawsuits, having these digitally*

signed contracts provides a legal basis for litigation. By ensuring legal compliance, critical nodes along our business processes are secured…the entire financial risk control framework is supported by Outsideasy."

By providing peripheral SN members with access to essential financial support for DT (Benlian et al. 2018), Topsun addressed cost-related barriers, a substantial impediment to DT efforts within SMEs (Matt and Rauch 2020). This approach significantly bridged the resource gap among SN participants (Taiwo and Benson 2016) and strengthened the alliance between Topsun and its SN partners, fostering a more collaborative and digitally empowered SN.

On the other hand, assembling all SN participants on Outsideasy enabled the participants to gain **platform-driven visibility** from a diverse range of businesses for potential buyer-supplier relationships. Topsun demonstrated its inter-organizational leadership by facilitating and mediating platform-based B2B relationship building. The CDO highlighted this strategic shift:

"*The core of our approach now is to help them [SN participants] with the search…it's a reconfiguration of our service, where we reassemble and integrate the key elements – IT, finance, and the industry.*"

The Deputy Head of IT further distinguished the core-firm-led platform from conventional third-party-provided B2B platforms:

"When conducting field research, I heard the SMEs talk about Platform X [anonymized B2B platform], which requires an annual fee…yet they are in a dilemma…if they pay it, they can still receive a few daily inquiries looking for suppliers or buyers…but most of these are junk inquiriea…the platform does help with handshaking, which is useful in getting some traffic, but with very low number of valid transactions…But our platform and approach are based on our core tangible businesses, which is promising in bringing actual orders [to the participants]. There is a fundamental difference."

The core-firm-led SN platform took a critical role in enhancing SN connectivity, optimizing data, and other resource integration to drive collaborative opportunities, which in turn, reinforces the collective pursuit of SNDT by all SN participants.

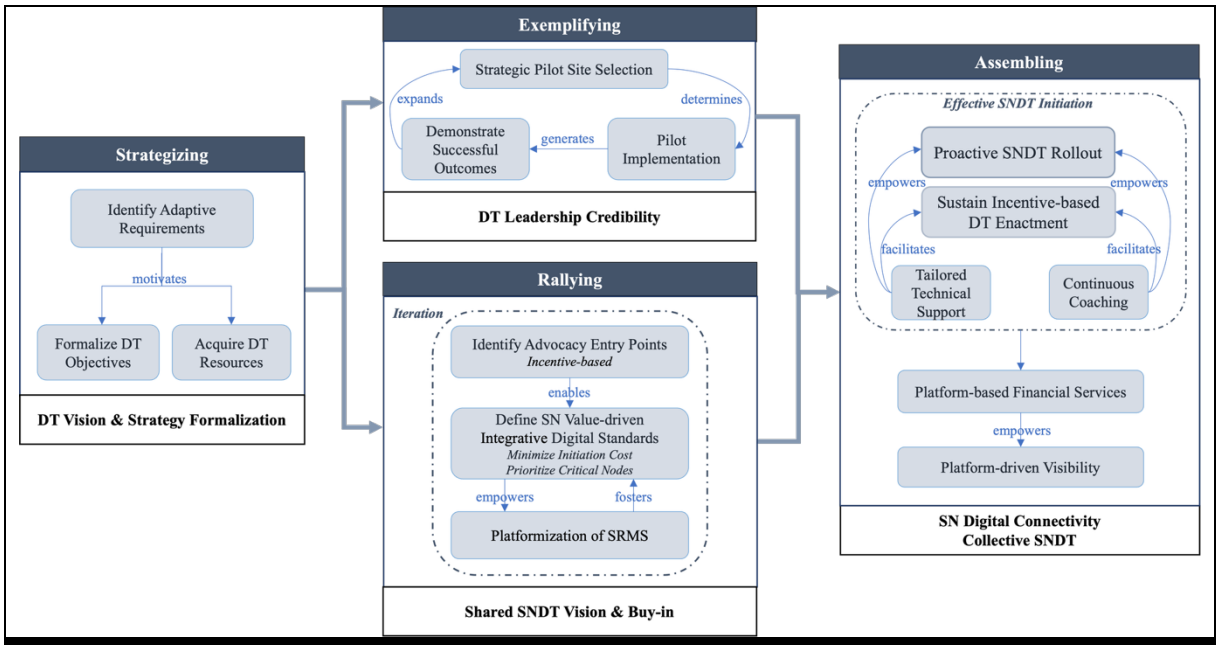

Figure 2. The Four Mechanisms of Inter-organizational DT Leadership

The aggregate dimensions and themes that were revealed in the findings for all four mechanisms, along with the supporting evidence from our interviews, are presented in our data structure in *Table 3*. The four mechanisms and their constituent steps are presented in *Figure 2*.

2.5 Discussion

Based on the findings across the four mechanisms, a theoretical framework that depicts a core firm's attainment and enactment of inter-organizational DT leadership within a supply network for effective SNDT is inductively derived to address our research question. Our framework highlights that inter-organizational DT leadership, attained and enacted by the SN core firm, is pivotal in driving a shared vision and building the necessary capabilities among SN participants, thereby enabling effective SNDT. The process of attaining and enacting such leadership unfolds through four key mechanisms: strategizing, exemplifying, rallying, and assembling.

The constitution of the four mechanisms is summarized in Table 4 and detailed in the subsequent section. Furthermore, our findings led to the identification of two higher-order leadership dimensions – leadership composition and leadership state – which characterize the inter-organizational DT leadership in SNs. Leadership Composition captures the different leadership styles that are configured to support SNDT, whereas Leadership Sate reflects the evolving relational conditions of the core firm within its SN, and its readiness in enable coordinated actions.

Table 4: Constitution of the Four Mechanisms

Mechanism	Strategizing	Exemplifying	Rallying	Assembling
Strategic Direction	Core firm-Centric DT Vision Articulation	Leadership Credibility Accumulation	Collaborative SN Mobilization	Transformational Business Model Innovation
Leadership Composition	Transformational Leadership	Transformational Leadership	<Transition> Transactional Leadership ⇓ Transformational Leadership	<Hybrid> Transaction Leadership & Transformational Leadership
Leadership State	Emergence	Readiness	Maturity	Acceleration
Practices	• Shift the scope of change from focal organization to SN • Formalize DT objectives: digital standardization integration • Acquire DT resources	*Iterative Process:* • Select pilot sites based on urgency & willingness • Pilot implementation • Demonstrate successful outcomes	*Iterative Process:* • Identify & incentivize proximal SN partners • Define SN Value-driven integrative digital standards • Platformization of SRMS	• Effective SNDT Initiation • Business Model Innovation: – Platform-based financial services – Platform-driven visibility
Outcome	Formalized Core-firm-Centric DT Vision & Strategy	SNDT Leadership Legitimacy	Shared SNDT Vision & Buy-in	SN Digital Connectivity Collective SNDT

Strategizing & Exemplifying

Our study reveals that while a core firm's DT leadership operates at the inter-organizational level, attaining such leadership requires an internally driven process. This involves formalizing an internal DT vision and strategy (i.e., strategizing), followed by iterative organizational-wide DT realization through pilot implementation and showing early successes (i.e., exemplifying).

Strategizing plays a pivotal role in establishing inter-organizational DT leadership. Although a core firm's DT planning process might be triggered by internal requirements, as suggested by our study, it needs to formalize a high-level DT strategy in response to dynamic organizational and environmental conditions, with a clear vision of leading its immediate SN for DT. This process aligns with literature suggesting that leaders define and articulate strategic goals to respond to the "external or environmental contingencies" (Zaccaro and Banks 2001, p. 181). In the context of SNDT, it echoes literature emphasizing the need for organizations to set their DT vision beyond organizational boundaries for successful SNDT (Hartley and Sawaya 2019; Kraus et al. 2021). This vision should foster the core firm's emergent leadership capability to coordinate its internal DT initiatives with its SN partners to account for the complex interdependencies within the SN (Barratt and Barratt 2011; Hearnshaw and Wilson 2013). Moreover, our findings emphasize that a core firm's DT strategy must underscore the tactical DT objectives that are essential for product firms, including digital standardization and integration (Björkdahl 2020), and adequate DT resources (Gilch and Sieweke 2021). This prepares the "internal conditions" (Zaccaro and Banks 2001, p. 181) necessary for the exemplifying mechanism to support the development of inter-organizational DT leadership.

The exemplifying mechanism allows a core firm to build leadership credibility at the SN level by accumulating demonstratable, repeated successes derived from its formalized DT objectives (i.e., digital standardization & integration) and expertise in implementing complex DT processes in the manufacturing industry. The findings align with the literature that highlights

leader expertise as a critical construct to form leadership credibility, which is identified by Bass and Steidlmeier (1999) as a foundational moral component of transformational leadership. The accumulated expertise, in turn, enhances the persuasiveness of the core firm's messages to its SN followers (Pornpitakpan 2004; Umeogu 2012). Furthermore, as suggested in existent literature, the truthful, demonstrable DT successes further enhance SN members' trust in the core firm as a leader-to-be and prepare the core firm as a credible leader (Bass and Steidlmeier 1999) for subsequent SNDT.

Rallying

After the early successes accumulated and exemplified internally, to foster effective SNDT, the core firm must secure buy-in from its SN partners to establish a shared SNDT vision by leveraging its accumulated DT leadership credibility externally. Our findings indicate that a rallying mechanism is essential and should operate partially in parallel with exemplifying, as a core firm cannot complete comprehensive internal DT without including its SN partners. This observation aligns with the literature highlighting the complex interdependencies of SN participants (Hearnshaw and Wilson 2013; Tang et al. 2016), which reinforces the necessity of having an SN vision while strategizing for DT.

Our findings indicate that the initial onboarding of SN partners often encounters significant resistance due to cost concerns. To mitigate this, the core firm should prioritize engaging the most proximal SN partners—those with the highest transaction frequency and value—as advocacy entry points for SNDT adoption. This aligns with studies emphasizing the critical role of transactional leadership, which is based on relational value exchange (Mokhtar et al. 2019b), in motivating SN followers to align their economic interests with collective goals (Jensen et al. 2019). Specifically, proximal SN partners are required to comply with the core firm's digital standards to maintain transactional relationships, which inherently operate within a rewarding/sanctioning system led by the core firm (Hult et al. 2007; Zhou et al. 2022).

Simultaneously, the core firm should minimize the initial costs required from its proximal SN partners to optimize the tangible benefits of compliance (Xenikou 2017). This approach shapes the "objective reality" of SN partners (Anderson and Anderson 2010, p. 166), fostering SN buy-in and a shared vision and advocacy of SNDT.

As the core firm accumulates leadership credibility and strengthens proximal SN partners' commitment and readiness for DT, its inter-organizational DT leadership operates from a transactional-driven to a transformational-driven manner (Bass 1990). At this stage, the core firm's inter-organizational DT leadership comes to maturity (Schumacher et al. 2016), which will be further accelerated by amplifying its influence over its entire SN.

Assembling

Finally, for effective SNDT to unfold, our model suggests that the core firm must accelerate the obtained inter-organizational DT leadership to mobilize a broader spectrum of SN partners to engage in its SNDT initiatives, while also empowering proactive DT initiatives of earlier SN participants. This mobilization is featured by the enactment of hybrid inter-organizational DT leadership, which encompasses both transactional and transformational leadership behaviors. On the one hand, our findings highlight that the shared SNDT vision led by the core firm enables proactive SNDT rollout, amplifying the scope of SNDT initiatives across multiple tiers of the core-firm centric SN, particularly through snowballing of shared digital standards (i.e., transformational leadership outcomes; Świerczek 2014). On the other hand, our case study highlights the importance of continuing to incentivize participants on the SN periphery via the transaction-based onboarding strategy (i.e., transactional leadership outcomes). Both approaches are sustained through ongoing coaching and customized technical support, which characterize the transformational aspects of the core firm's inter-organizational DT leadership (Birasnav et al. 2015). These measures mitigate resistance, foster trust, and encourage long-term commitment to SNDT initiatives among SN participants (Kumar and Van Dissel 1996;

Mokhtar et al. 2019a), ultimately enabling enduring SNDT collaborations (Afsar and Masood 2018; Swärd 2016).

Moreover, our study highlights the pivotal role of the core firm's cloud-based platformization of SRMS in leading effective SNDT in various ways. The platform not only enables real-time integration and tracking of SN data but also serves as a foundation for SN business model innovation, shifting the role of product buyer and suppliers into service recipients. This aligns with research emphasizing the importance of business model innovation (Frank et al. 2019) and new organizational identity formation (Wessel et al. 2021) as critical outcomes of successful DT. Specifically, our case study reveals that the three core elements of SNDT – digital infrastructure, service-oriented business model, and SN participants – are cohesively assembled on one platform as inter-organizational leadership accelerates. This allows the core firm to transition its buyer-supplier relationship into a more diverse and collaborative one. First, our findings indicated that by leveraging the integrated platform data, the core firm extends its transactional leadership behaviors (Xenikou 2017) by providing innovative platform-based financial services to its SN partners. These services, supported by accurate, transparent, and real-time data, are delivered at low risk, addressing resource constraints to SNDT (Jacobs and Mafini 2019). Second, while digital platforms are commonly used as hubs for connectivity that enhances visibility and B2B relationship building (Shree et al. 2021), our findings suggest a distinguishing and critical feature of core-firm-led platforms. Unlike conventional third-party platforms, which often emphasize superficial interactions or "handshakes," core-firm-led platforms integrate tangible business opportunities that are relation-specific, ensuring meaningful transactions between the connected SN participants. By embedding relation-specific resources within the platform, these initiatives drive transaction cost benefits and foster deeper SNDT collaboration (Cheng 2011; Rajaguru and Matanda 2013).

While the four mechanisms emerged inductively from grounded analysis to develop the concept of inter-organizational DT leadership, our findings also extend existing leadership theories, particularly transactional and transformational leadership. Our framework demonstrates how Topsun's leadership behaviors extend and hybridize elements of both approaches at the inter-organizational level, and in ways that are specific to the SNDT context. Specifically, our findings revealed that effective SNDT leadership requires a transactional leadership to execute the core firm's influences through contingent incentives, standard setting, and structured monitoring, which is consistent with contingent rewards and monitored coordination suggested in Hult et al. (2007) and Birasnav et al. (2015). However, our findings also highlighted the significance for the core firm to transition from transactional leadership to a hybrid form with transformational leadership to extend the scope DT initiatives among the multi-tiered, interdependent SN. That is, SNDT not only escalates leadership demands from an individual level to inter-organizational level, but also to a hybrid form of leadership adapted to distributed, multi-tier contexts.

The aggregate dimensions and themes revealed in the findings for all four mechanisms, along with the supporting evidence from our interviews, are presented in our data structure in *Table 11* (see *Appendix A*). The four mechanisms and their constituent steps are summarized in *Figure 2*.

2.6 Conclusion

Theoretical Implications

First, this study introduces a conceptual innovation by defining inter-organizational DT leadership as the credible leading position a core firm obtains by establishing and realizing a DT vision that extends beyond its organizational boundaries. It is enacted through a hybrid approach involving incentivization, shared envisioning, as well as constant and tailored support,

enabling the alignment of digital standards and resources to sustain inter-organizational DT collaboration. As prior research suggests, SNDT is inherently a collaborative endeavor that requires intra- and inter-organizational efforts (Hsu et al. 2015; Vial 2019), but not all firms within an SN possess the influence or authority to drive DT across the entire network. Core firms, given their resources and capabilities, are uniquely positioned to mobilize resources and coordinate complex processes on behalf of their network partners (Wu et al. 2014). This conceptual innovation enriches the theoretical discourse by addressing the specific inter-organizational leadership mechanisms that underpin effective SNDT. By developing a coherent theoretical framework that unifies these mechanisms, this study illuminates their concrete activities and structures, which drive the emergence, readiness, maturity, and acceleration of inter-organizational DT leadership. These insights clarify how core firms cultivate and sustain collaboration across SNs, thereby advancing our understanding of how effective SNDT is achieved. This study offers a basis for further research to examine, extend, and delineate boundary conditions of our theoretical framework.

In addition, this study advances the current understanding of SNDT by addressing a notable gap in prior research on how DT is operationalized across complex networks. Prior studies have predominantly focused on examining individual technological components relevant to network partners, with less emphasis on understanding the underlying dynamics of SNDT (e.g., Gölzer and Fritzsche 2017; Korpela et al. 2017). Given the growing importance of SN transformation for traditional product firms to remain competitive (Ma et al. 2020), and the increasingly intricate interdependencies within SNs (Braziotis et al. 2013; Hearnshaw and Wilson 2013), this study addresses a pressing need for empirical and theoretical insights into SNDT. More specifically, our findings reveal that achieving SNDT requires a core firm to drive four key mechanisms in a specific sequence, including strategizing DT with an SN-vision, exemplifying internally to accumulate leadership credibility, rallying advocates for DT at the

SN level, before assembling all SN participants to implement DT initiatives with SN business model innovation. This marks a significant contribution because uncovering the underlying mechanisms of inter-organizational DT leadership offers a novel angle through which the full strategic and business potential of SNDT can be harnessed (Cousins and Menguc 2006; Ngai et al. 2008). In essence, our study offers a unique yet comprehensive understanding of SNDT as a collaborative, multi-stage process. By revealing the underlying mechanisms and their interdependencies, it moves beyond surface-level descriptions of technological adoption to uncover the strategic orchestration required for SNDT success. Building on this study, future research might extend the research inquiry on SNDT through the lens of peripheral network participants. Their actions may play a critical, if often overlooked, role in shaping SNDT.

Finally, our study contributes to the existing knowledge of SCL by transcending the conventional dichotomy between transformational and transactional leadership. It delves into the potential coexistence and synergies between these leadership styles to foster effective collaboration in the SN context. While prior research has emphasized the distinct impacts of these leadership styles on SN collaboration (e.g., Chen et al., 2021), calls to explore their interplay have largely remained unanswered (Mokhtar et al., 2019a). Our study addresses this gap by illustrating how the integration of transactional and transformational leadership dimensions enables the evolution of inter-organizational leadership, particularly in the context of SNDT. Specifically, our study highlights that transactional leadership dimensions, such as incentivizing and contingent rewards, play a critical role during the initial stages of SNDT by driving compliance and reducing resistance among SN participants. These mechanisms create the necessary alignment of economic interests and establish a foundational structure for collaboration. Simultaneously, transformational leadership dimensions—fostering a shared vision, and providing ongoing and tailored support—build trust, commitment, and long-term engagement within the SN (Swärd 2016; Mokhtar et al. 2019a). This dual approach not only

accelerates the onboarding process but also sustains collaboration by fostering deeper interdependencies and mutual growth among SN participants. Importantly, our findings affirm the interplay between these leadership styles is dynamic and context-dependent. While transactional leadership is pivotal in securing early buy-in and ensuring adherence to the core firm's digital standards, transformational leadership becomes increasingly critical as SNDT progresses to inspire, guide, and empower SN participants, ensuring the diffusion of collaborative DT initiatives across multiple tiers of the SN. The study underscores the synergistic potential of these leadership styles, where transactional leadership provides the structural foundation for collaboration, and transformational leadership cultivates the relational and strategic depth necessary for sustained SNDT success. This integration of leadership styles extends the theoretical understanding of SCL by demonstrating how hybrid leadership approaches can foster collective innovation, align diverse interests, and drive DT at the inter-organizational level. These insights offer valuable implications for future scholars to navigate the complexities of SNDT, emphasizing the need for adaptive leadership strategies that balance immediate transactional goals with long-term transformational aspirations.

Practical Implications

In addition to the theoretical contributions, this study offers important implications for industry practitioners by elucidating mechanisms through which core firms can guide SNDT in legacy sectors. As such, this study offers prescriptions to address potential misalignments of resources, capabilities, and visions across the network, thereby enabling effective DT across an SN (Preindl et al. 2020). As such, this study offers practical insights for two primary stakeholder groups.

First, by identifying prescriptive mechanisms for enacting inter-organizational DT leadership, this study provides a strategic guide for influential firms of traditional sectors that aim to take the leadership role and champion network-wide DT. This roadmap supports the firms to make

informed decisions and determine actionable steps and critical resources for executing SNDT. For instance, understanding the rallying mechanism discussed in this study can help core firms pinpoint effective entry points for launching DT efforts within the network. Specifically, core firms can identify advocacy entry points as proximal partners with whom they transact most frequently to initiate incentive-based rallying (Sammon and Adam 2010), define SN Value-driven integrative digital standards with these partners, and platformized their SRMS. These established interdependencies, relations, and demonstrated benefits ease the burden on the core firm to build strategic consensus around SNDT (Gray 1985), contributing to more streamlined and effective assembling endeavors.

Second, our study also offers value to peripheral actors within their SNs, which are typically smaller or less-resourced firms that frequently face constraints in initiating DT independently (e.g., Li et al. 2018; Pierce 2009). Our framework also serves as a valuable lens for peripheral entities to gain insights into strategic motivations and operational expectations underlying core firms' DT initiatives, particularly the digital requirements and standards that are mandated by a core firm (Swärd 2016). Such understanding could prompt peripheral firms to proactively establish organizational conditions conducive to DT, including investing in efforts to induce an internal shared DT vision and paving the way for collaborative DT initiatives within their business networks (see Swärd 2016), thereby building readiness and cultivating capabilities for joint DT initiatives and increasing network resilience.

Limitations & Future Research

This study is not without its limitations. More specifically, although the single case research method used in our study is a "typical and legitimate endeavour" in qualitative IS research,(Lee and Baskerville 2003, p. 231), the generalizability of our findings and process model may be an issue given the singular context of our study. Consequently, future research should seek to validate and extend our theoretical framework with additional cases where core firms have

enacted inter-organizational DT leadership successfully for effective SNDT. The boundary conditions and implications of our framework may also be identified through a review of the emerging DT literature and further analyses of our data. By collecting and incorporating further data, and subjecting the data to more in-depth analyses, we hope to refine our theoretical framework further so that a more holistic understanding of SNDT leadership, as well as its strategic and organizational implications, can emerge.

A second limitation is that although we were able to identify a number of mechanisms relevant to the attainment and enactment of inter-organizational DT leadership in the case of Topsun, we are constrained by the limits of the data collected and must acknowledge that other variations to the mechanisms we uncovered and the sequence between them may be possible. Indeed, the impact of DT mechanisms tends to be both context and path-dependent (Vial 2019), and since both of these aspects (i.e., the environmental conditions and historical context surrounding a firm) are highly variable, they may give rise to a myriad of other outcomes, both positive and negative. While it is certainly impossible to capture all the possible ways in which inter-organizational DT leadership can be achieved and exercised within a single study, we submit that our framework can nevertheless serve as baseline for future studies to build upon because many of its constituent constructs and mechanisms do not appear to be context- or organization-specific. Nevertheless, the potential alternative sequences and mechanisms relevant to inter-organizational DT leadership would certainly be a fruitful avenue for future research.

Chapter 3: Navigating Digital Transformation for Not-for-Profits: Exploring Resource Fluidity

Abstract

Digital transformation (DT) is a pervasive phenomenon with substantial impact across organizational and societal levels, yet current scholarship largely centers on for-profit contexts where resource ownership is implicitly assumed. This leaves a critical gap in understanding how not-for-profit (NFP) organizations with critical societal impact, which are characterized by limited internal resources and heightened accountability, navigate DT. Drawing on a grounded qualitative case study of a large faith-based NFP organization in New Zealand, this paper explores how NFP organizations access and mobilize DT resources without mandated ownership. This study uncovers that DT inNFPs is underpinned by the concept of resource fluidity, a state enacted through a three-phase process: (1) *Identification* of resources with polymorphic potential, (2) *Activation* through organizational capabilities of envisioning, redeployment, and experimentation, and (3) *Application* guided by mission-driven governance. This study contributes to DT research by shifting the focus from proprietary resource configurations to flexible access-based arrangements and offers a contextualized understanding of how NFP organizations can enact cost-effective and mission-aligned DT under resource constraints.

3.1 Introduction

Digital transformation (DT) refers to a fundamental process of reconstruction across all levels of an organization to exploit the benefits of digital technologies (Nadkarni and Prügl 2021), which induces changes to its business processes, operations, and structures (Fenech et al. 2019; Wessel et al. 2021). DT also has profound implications for individuals and society in general that are

beyond the scope of a single organization (Vial 2021). The transformative benefits and opportunities derived from digital technologies and strategies have underscored the strategic significance of DT (Singh et al. 2020) in almost all industries and contexts in the contemporary world (Hanelt et al. 2022). Moreover, the COVID-19 pandemic catalyzed a lasting shift, compelling organizations to initiate and/or accelerate DT to combat new challenges that emerged during and post the pandemic, including fast response required to support the community – both material support and mandated immediate online engagement for emotional support – and longer run digital presence (Hanelt et al. 2022; Weinberger-Litman et al. 2020).

However, DT often brings new challenges to the focal organizations on costs to acquire, and efforts to manage new or reallocate existing technological and human resources (Nadkarni and Prügl 2021). While these resources may possess some characteristics of organizational strategic resources (Barney et al. 2021) and the dynamic capabilities that are higher-order organizational routines (Winter 2003), they manifest differently in the context of not-for-profit (NFP) organizations. That is, the RBV suggests that strategic resources possess attributes such as rarity and inimitability (Barney et al. 2021), which are rooted in costly acquisition, development, and protection. In a similar vein, dynamic capabilities are a series of higher-order organizational routines to recombine resources into new capability bundles (Winter 2003), which also presuppose a degree of stable ownership over resources (Piccoli et al. 2020; Wernerfelt 1984).

This assumed ownership, however, poses significant theoretical and practical challenges when applied to organizations that cannot afford the costs of obtaining, developing, and mobilizing such resources for DT purposes (Li et al. 2018). In practice, not-for-profit organizations (NFPs) rarely develop or hold DT resources internally, but frequently operate with extensive reliance on restricted resources that are external, shared, and voluntarily contributed (Candler and Dumont

2010; Senyo et al. 2024). These differences bring unique challenges for NFPs in mobilizing DT resources, with heightened scrutiny and accountability pressure when making DT-related decisions (Magnusson et al. 2020). At the same time, NFP organizations tend to maintain broad and sustained access, rather than ownership, to a variety of resources given their shared mission and collaborative ties with local communities (Gee et al. 2023). This mode of access, though fluid and decentralized, presents a strategic opportunity for NFP organizations. These contextual specificities render existing resource-based explanations insufficient, calling for a new theoretical lens that can capture how transformation unfolds through contingent, shared, and fluid forms of resource access: by cultivating a flexible and transient arrangement, NFPs can enact DT without relying on proprietary, stable resources.

However, the existing prescriptions for DT tend to be investigated in for-profit contexts (e.g., Piccoli et al. 2024), assume resource ownership (e.g., Matt et al. 2015) and proprietary resource configurations (e.g., Gurbaxani and Dunkle 2019), offering limited insights into how DT unfolds in contexts where resource access is contingent, dynamic, and non-exclusive. The uniqueness of the NFP context could also render the traditional prescriptions of the resource-based theory less relevant or applicable (Liu et al. 2011). Building on the limitations of RBV and DC highlighted above, this study seeks to extend theorizing on DT to account for contexts where transformation unfolds without proprietary control over resources. Specifically, this paper aims to address the critical question: "*How do NFPs identify and mobilize the resources required for DT without ownership?*"

To answer this research question, we theorize how resource-constrained NFPs identify, access, and manage DT resources without owning them. By conducting a grounded theory-guided case study (Strong and Volkoff 2010) of City Impact Church (CIC), a large faith-based organization in New

Zealand, this study develops a process model that explicates the emergence and enactment of *resource fluidity* as a key capability to guide the flexible and transient resource arrangements for DT in NFP organizations. Although rooted in the same theoretical base as the RBV and dynamic capabilities, resource fluidity differs in its focus and assumptions. Whereas previous theories emphasize the rarity and inimitability of strategic resources or higher-level routines for sustaining competitive advantage (Barney et al. 2021; Winter 2003), resource fluidity concerns the ease and adaptability of resource access and redeployment. In the NFP context, where resource acquisition and protections are costly, resource fluidity captures the capacity to rapidly access, redeploy, and recombine resources across organizational boundaries to achieve mission agility that emerged inductively from our case study. In doing so, our study enriches the existing DT literature by shifting the analytical lens from the resource-ownership grounded ones to resource access and fluidity, offering insights into how DT can be achieved in organizations characterized by limited in-house resources and dependence on externally sponsored, flexible configurations.

3.2 Background Literature

Following the grounded theory methodology, we did not initiate the study with predefined theoretical frameworks (Glaser 2017) beyond our intent to study DT in the NFP context. The theory developed from our data includes constructs with some history in the literature of resource features in the NFP context. Yet, this literature was folded into our emerging theory only after our data analysis. However, adopting the approach by (Strong et al. 2014), we review the literature on DT and resource features in the NFP context for the readers' clarity.

3.2.1 Resource Dependence & Access in Not-for-Profit Context

Not-for-profit organizations (NFPs) are driven by complex social missions rather than profit-oriented values, aiming for meaningful social impact (Gee et al. 2023; Hull and Lio 2006). As such,

the distinctive characteristics of NFP organizations also lead to distinct challenges and opportunities for them in accessing and mobilizing resources for DT initiatives.

NFP organizations operate under persistent resource constraints regardless of their size due to their strong dependence on external funds (Malatesta and Smith 2014) such as philanthropic donations, sponsorships, and the government (Callen et al. 2010). Such dependence creates a heightened need for resource-related decision transparency, accountability, and demonstrable impact (Hull and Lio 2006) when mobilizing resources for DT initiatives. Unlike for-profit organizations that primarily account to shareholders on financial performance, NFP organizations depend on various stakeholders, including funders, employees, volunteers, and the community (Hyndman and McConville 2018). Thus, prioritizing accountability management practices is essential for NFP organizations in making strategic choices to maintain public trust and stakeholder support (Chen et al. 2020). Moreover, NFP organizations often lack extensive internal administrative structures for professional human resource management, and strategic DT planning (Akingbola 2006). Specifically, NFP organizations, particularly those in low-innovative areas, are commonly characterized by limited internal expertise and resources to develop and afford purchasing specialized technologies (Hull and Lio 2006) necessary for DT.

Despite the challenges, the defining mission-oriented nature of NFP organizations (Chen et al. 2020; McDonald 2007) plays a critical role in navigating the complex resource dependence and limitations in the NFP context. The societal missions and impact position NFP organizations as attractive partners to corporations and the government for strategic collaboration (Holmes and Moir 2007; Malatesta and Smith 2014), which grants NFP organizations access to broader external resource pools, including tested technologies and management practices (Akingbola 2006; Hull and Lio 2006). Internally, a clear and motivating mission can help NFP organizations create a

supportive culture and foster employee and volunteer commitment to new projects despite limited financial incentives (McDonald 2007). This mission-driven commitment not only reduces resistance to change and relevant costs but also enhances volunteer engagement (Becker 2018). Moreover, the ability to attract sustained voluntary participation, additional resources, and donors (Eikenberry 2008) often hinges on the alignment between the NFP's mission and its perceived value, trustworthiness, and legitimacy from external supporters (Chen et al. 2020).

3.2.2 Digital Transformation

Incumbent organizations from various traditional sectors have initiated DT (Hanelt et al. 2022) for the exploitation of benefits and opportunities derived from digital advances to "sync with the contemporary world" (Kioko and Musau 2020, p. 74) against the backdrop of the broader context of the "digital age" (Seidel et al. 2025). It is widely recognized that the enactment of DT has led to numerous improvements to both the focal organizations and their industries, resulting in benefits such as enhanced customer experiences, operational efficiency optimization, and emerging business opportunities (Baiyere et al. 2025; Rosamartina et al. 2022). Furthermore, the global COVID-19 pandemic prompted many long-established sectors that previously hesitated to engage in DT due to legacy structures and resource constraints to adopt digital-enabled operating methods (Chand et al. 2021; Golinelli et al. 2020). Existing DT research can be broadly categorized into three main streams.

The first stream concerns **conceptualizing the nature of DT**, offering varied perspectives of how DT unfolds within organizations. Some research views DT as a radical and qualitative shift that transforms organizational identity (Wessel et al. 2021), value creation logic, and operational routines (Baiyere et al. 2020; Seidel et al. 2025). Others conceptualize DT as a staged process, consisting of distinct phases through which digital maturity is systematically developed (Kane et

al. 2017; Verhoef et al. 2021). Alternatively, DT is viewed as an iterative and emergent process, characterized by non-linear progression, where both planned and unplanned outcomes arise (Pittaway and Montazemi 2020; Senyo et al. 2024).

The second stream is centered on the **antecedents and drivers of DT** that highlight how technological advancements and broader societal socio-technical changes (Bharadwaj et al. 2013) bring opportunities and pressures for organizations to transform. Rapid evolution of digital technologies and infrastructures (Serrano 2018), changing consumer demands (Castagna et al. 2020), and intensified competition from digital entrants (Sebastian et al. 2017) have collectively driven incumbent firms to reorient their strategies (Granados and Gupta 2013), reconfigure operations (Baiyere et al. 2020), and build new capabilities (Warner and Wäger 2019)to remain relevant in the digital age.

The final stream focuses on the **multi-dimensional outcomes of DT**, encompassing both benefits and unintended consequences across organizational and societal levels. Studies have uncovered that DT brings improved organizational performance (Karimi and Walter 2015), operational efficiency (Du et al. 2016), and innovation capabilities (Svahn et al. 2017), while also renewing organizational value creation and business model reconfiguration (Baiyere et al. 2025; Palmié et al. 2022). At the societal level, DT also contributes to enhanced quality of life (Agarwal et al. 2010) and crisis resilience (Lee et al. 2024). However, unintended consequences such as organizational resistance and social relationship destruction are also acknowledged (Deng et al. 2016; Leong et al. 2016).

Upon reviewing the literature, existing DT research has yielded rich insights into how organizations transform through digital technologies, with impact beyond organizational boundaries, with influences at the individual, industry, and societal levels (Dąbrowska et al. 2022;

Seidel et al. 2025; Vial 2019). However, prevailing theories are implicitly grounded in the assumption of resource ownership, strategic autonomy, and market-driven outcomes (e.g., Baiyere et al. 2025; Piccoli et al. 2024; Wessel et al. 2021). These assumptions constrain their applicability to NFP contexts, where transformation unfolds through contingent, relational, and fluid resource arrangements. In addition, while NFPs face persistent resource constraints due to structural limitations and accountability pressures (Malatesta and Smith 2014), their mission-driven identity and extensive collaborative networks afford them unique opportunities to access and mobilize diverse resources (Chen et al. 2020; Holmes and Moir 2007). These conditions require an alternative explanation of how DT can occur without proprietary resource control to acknowledge the transient, relational, and fluid nature of resource mobilization in the NFP setting.

To address this gap, our study inductively develops the concept of *resource fluidity* as a novel lens for understanding DT in resource-constrained, mission-driven organizations. While the term 'resource fluidity' has appeared sporadically in management research, these earlier (e.g., Kitur and Kinyua 2020; Rotich and Okello 2019), these earlier mentions are largely descriptive and lack theoretical development. None has captured the operational features or relational mechanisms through which organizations access, redeploy, and recombine non-owned resources access organizational boundaries.

We define resource fluidity as an organization's capacity to reconfigure access to, recombine, and redeploy available and accessible resources across tasks and time with minimal friction. It centers on the mobility, recombination speed, and permeability of resource boundaries inside and across organizations. While sharing conceptual ancestry with RBV and dynamic capabilities, resource fluidity diverges in its key assumptions and focus. Developed inductively through grounded theory approach, resource fluidity emerged from our empirical data analysis in the NFP context, where

the case organization navigates DT without resource ownership. We subsequently compared the construct against previous theories to clarify its lineage while distinguishing its unique focus on access-based, rather than ownership-based, resource arrangements.

That is, unlike strategic resources in the RBV, which emphasize rarity and inimitability to create sustainable competitive advantage (Barney et al., 2021), resource fluidity does not require exclusivity or permanence. Similarly, unlike DCs, which refer to higher-order routines that sense, seize, and transform by orchestrating change (Teece et al. 2016; Winter 2003), resource fluidity reflects the malleability of the resources themselves - the state and swift practice of fluid access and redeployment that DCs may leverage or enable.

This framing allows us to explain how NFPs navigate persistent resource scarcity and organizational constraints to build digitally enabled capabilities through flexible and transient resource arrangements. In doing so, the study advances DT scholarship by shifting the attention from ownership-based perspectives an access- and fluidity-based one, offering a context-sensitive explanation of how DT unfolds under structural constraint and mission-driven purpose.

3.3 Research Method

The case study method is employed and is particularly appropriate for our study because it is especially appropriate for addressing "how" questions (Walsham 1995a), examining processes (Orlikowski and Baroudi 1991), and exploring multi-faceted phenomena that are inextricable from their natural context (Klein and Myers 1999; Yin 2017) – all conditions are relevant to our study.

To address our research question, we established two case selection criteria. First, the selected case needs to be a mission-driven NFP organization that has a track record for effectively accessing and managing the resources required for DT without having to owning those resources so that it can

shed light on the nature and implications of the flexible and transient resource arrangements in the NFP context. Second, the selected organization should have successfully enacted DT to enhance efficiency and effectiveness because we are looking to develop a theory based on proven, if not best, practices (Au et al. 2020). Based on these criteria, the case of City Impact Church was selected because it has successfully leveraged its accessible resources through flexible arrangements to cultivate capabilities and enable multiple DT initiatives that have generated significant benefits to both the faith-based organization and its community.

3.3.1 Case Background

Established in 1982, City Impact Church (CIC) is a Pentecostal church based in East Coast Bays, New Zealand. Driven by a faith-driven vision and a mission to lead, connect, and nurture communities through shared Christian faith, CIC has expanded its physical presence across seven countries, including New Zealand, Canada, India, Mexico, the Philippines, Tonga, and Fiji. Beyond faith-based community initiatives, CIC has been sponsoring or building orphanages, schools, and health clinics across rural areas in India, Tanzania, and China to support their local educational and medical needs. To sustain its mission among younger generations and respond to the digitalization trend accelerated by the global pandemic, CIC has undertaken a series of digital initiatives for digital transformation. Notably, it has transitioned from a physical-based organization to a hybrid model by developing an online campus, enabling global accessibility and engagement for its members at all ages. Leveraging its community influence, CIC hosts a number of hybrid community initiatives to serve its local communities, with the mobilization of approximately 700 volunteers.

Although shaped by its faith orientation, the distinctive characteristics of CIC, including strong mission orientation, relational trust networks, volunteer dependence, and emphasis on community

value, mirror the key structural and operational features shared by many NFPs. Moreover, Moreover, it operates under persistent resource constraints despite having a large congregation. CIC relies heavily on volunteer labors, donation, and mission-driven participation, rather than formal staff or predictable revenue streams, which produce the very resource fragility, informal governance structures, and episodic access to capabilities that the NFP literature highlights as central challenges for DT (Akingbola 2006; Hull and Lio 2006). These key characteristics of CIC make it a suitable and analytically generalizable case for understanding how resource-constrained, mission-driven organizations could mobilize accessible, non-owned resources for DT, which aligns with our research objective.

3.3.2 Data Collection

With the intent to study DT in an NFP setting, case access was granted by the gatekeeper in October 2020. The study was designed and conducted with two phases: the preparatory phase and the interview phase. In phase one, we focused on collecting and analyzing secondary data from CIC's websites, biographies, and YouTube channel to gain an overview of CIC's mission, structure, digital presence, and its operations, which served as the basis for formulating our interview questions on CIC's DT initiatives in the subsequent interview phase. In the subsequent phase, to explore how DT resources were mobilized for successful DT at CIC, primary data on DT resources and their mobilization at CIC were collected to address our research question.

Ten face-to-face semi-structured online interviews were conducted via Zoom from October 2020 to June 2021 to collect primary data, with an average length of 65 minutes. To ensure "constant comparison" with previous data collected and constructs emerged (Urquhart et al. 2010, p. 359), no back-to-back interviews were scheduled to allow sufficient time for data analysis.

The informants included multiple stakeholders at CIC, including representatives of CIC's top management team (e.g., senior Pastors), technical support function, and other functional units (e.g., online marketing unit), as well as their volunteers, to represent "a variety of voices" (Myers and Newman 2007, p. 22). Adopting theoretical sampling (Glaser and Strauss 2017), the initial informants, including senior pastors and core DT personnels, were identified by the 'gatekeeper' of CIC, with subsequent informants identified via chain referral sampling (Biernacki and Waldorf 1981) because we, as external researchers, lacked the knowledge to do so independently (Pan and Tan 2011). All interviews were conducted based on semi-structured interview guides (see Appendix B for examples) that were designed based on the "nontechnical" literature (Strauss and Corbin 1998, p. 52) consulted during the preparatory phase. Each interview guide had a standard core list of open-ended questions about CIC's DT resource management and implementation (see Table 5). It also included specific questions that were tailored to each informant's role in the functional area that he/she represented (see Appendix B). This form of interview allowed us to elicit data relevant to our purpose of study while also capturing additional emergent information (Galletta and Cross 2013). Interviews continued until additional participants no longer yielded new first-order concepts or altered the emerging categories.

Table 5: Summary of Interviews Conducted for Study 2

Informant No.	Organizational Role	Key Themes Covered
1	National & Online Campus Pastor	Evolution of technology use in CIC, DT journey of CIC, DT implication on CIC's operation, resource acquisition in CIC, CIC's DT initiatives targeting different generations, resource repurposing in CIC, the implication of COVID-19 on CIC's DT journey

2	IT Manager	Role of IT in CIC, DT journey of CIC, CIC's DT initiatives designed for the younger generation, the leadership style of CIC, success factors and steps of CIC's DT journey, resource & idea acquisition of DT in CIC, role of technology in CIC, identification & activation of DT resources, adoption & repurposing DT resources, role of church leaders in DT
3	Production & IT Technician	Acquisition & arrangement of volunteers in CIC, drivers for DT, the implication of COVID-19 on CIC's DT journey, the evolution of DT vision in CIC, technical requirements for CIC's DT initiatives, new capability & expertise requirements for CIC's DT initiatives, uniqueness of DT in the church setting, resource repurposing in CIC
4	Creative Director	Evolution of technology use in CIC, DT journey of CIC, evolution of media use in CIC, DT implication on CIC's creative mediums, creative mediums as new outreaching channels, resource & idea acquisition of DT in CIC, limitation of technology, leadership style of CIC
5	Church Member & Child Care Teacher & Volunteer	Diverse work as different roles, use of digital channels, resource acquisition process in CIC, benefits of DT initiatives in CIC, individual DT adoption process, DT implication on working experience in CIC, negative consequences of CIC's DT initiatives, DT implication to CIC's vision attainment, motivation to be a volunteer
6	National Children's Ministry Pastor	Evolution of CIC's Children's Ministry, DT implementation in Children's Ministry, the implication of COVID-19 on DT journey of Children's Ministry, the value of DT initiatives, selection criteria of digital media, process of digital content generation, church support on DT initiatives in Children's Ministry, the evolution of churchgoers
7	Volunteer	Working experience as a volunteer in CIC, culture diversity in CIC, the process of being recruited as a volunteer, resource acquisition & management in CIC, the implication of COVID-19 on working experience in CIC, the implication of DT initiatives on working experience in CIC
8	Online Campus Pastor	Role of faith in CIC's DT journey, nature of the online campus, the vision of online campus, benefits & challenges of CIC's DT initiatives, the transformation of traditional church services in the online setting, resource acquisition in CIC, resource mobilization for the online campus, the implication of COVID-19 on CIC's DT journey
9	Online Marketing Specialist	The transition of marketing activities in CIC, working experience uniqueness in the church setting, digital outreaching channels, the target audience of CIC, regular church member converting

		process, the implication of COVID-19 on CIC's DT journey, marketing resource repurposing in CIC
10	Worship Team Leader	The implication of COVID-19 on CIC's DT journey, worship evolution along the DT journey, resource mobilization of CIC, the role of leadership in the DT journey of CIC, resource acquisition & management in CIC, the influence of DT on voluntarism of CIC, selection & management of different digital channels

3.3.3 Data Analysis

Consistent with the grounded theory approach (Glaser 1968), and to fully leverage the flexibility of the case study method (Eisenhardt 1989), data analysis was carried out iteratively and simultaneously with data collection. Following a broad overview of CIC's DT journey obtained from the initial two interviews - with a senior pastor and the IT manager, both of whom had been with CIC for over 20 years - we utilized the temporal bracketing and visual mapping strategies (Langley 1999) to identify and document of the distinct temporal phases of CIC's DT process and our emergent theoretical ideas through a series of diagrammatic sketches. The narrative strategy (Langley 1999), were subsequently conducted, to allow a coherent account of the evolution of CIC's operations over time to emerge. The narrative and visual maps were then verified with the subsequent informants and modified with further data collected, if necessary, to ensure the validity of both our interpretation of the informants' accounts and the emerging theory (Pan and Tan 2011).

To ensure data accuracy and completeness (Walsham 1995a), each interview was digitally recorded and transcribed for data analysis. The collected data were then coded via a mix of open, axial, and selective coding (Strauss and Corbin 1998). We applied open coding to extract conceptual labels that constitute first-order concepts (e.g., "lack of permanent staff with IT skills," "key volunteers with strong digital expertise") from the excerpts of our interviews, which "capture the core issues, as identified by the speakers, in conceptual language" (Strong and Volkoff 2010, p. 735). Two researchers were involved in the data collection. After the data was collected, each researcher

examined the data obtained carefully and independently to allow for continuous triangulation of our observations and the interpretations of the collected data (Klein and Myers 1999). If there were conflicting interpretations or if clarifications and follow-up questions were deemed necessary, the relevant informants would be contacted via email or instant messaging. Emerging first-order concepts were documented for later theorization.

Axial coding was then applied to group these first-order concepts into a set of second-order themes (e.g., "Transient Resource Access," "Accountability Requirements"). This technique was used to code the conditions, actions and interactions, and consequences (Strauss and Corbin 1998). As a result, the key contextual triggers, action requirements, and consequences of CIC's resource management and DT initiatives emerged, which will be fully elaborated on in the following *Findings* section.

Finally, we applied selective coding for further refinement and integration of the first-order concepts and second-order themes. The concepts, themes, and dimensions will be continuously examined and adjusted (i.e., added new, modified, replaced, or deleted existing first-order concepts or second-order themes) as part of the coding process when new data emerge that add to, or conflict with the existing evidence (Strauss and Corbin 1998; Walsham 2006). This coding strategy allowed for a further abstract level of conceptualization beyond a description of the data (Urquhart et al. 2010). As a result, our second-order themes were distilled into three aggregated dimensions, including (1) *Identification* of resources with polymorphic potential, (2) *Activation* of resource fluidity, and (3) *Application* of the activated resource fluidity for DT purposes. Our emergent theoretical framework was inductively derived and gradually shaped via the recursive iteration and constant comparison against the data collection (Eisenhardt and Graebner 2007) to ensure the validity of our interpretation (Klein and Myers 1999). This process continued until the state of

theoretical saturation was reached (Glaser and Strauss 1967) around the ninth and tenth interviews, at which stage core categories such as polymorphic resources, activation triggers, and mission-driven governance had stabilized. This pertains to a condition in which the model derived through inductive reasoning can thoroughly explain the case data, and *"incremental learning is minimal because the researchers are observing phenomena seen before"* (Eisenhardt 1989, p. 545).

Table 14 (see *Appendix B*) presents a data structure (Gioia et al. 2013) illustrates how first-order concepts derived from open coding were abstracted into second-order themes, and subsequently into aggregated dimensions, which collectively constitute the emergent framework of resource fluidity.

3.4 Findings

The findings of our study of CIC suggest that in the context of NFP, organizations do not always own the resources required for DT, yet their ability to access and mobilize such resources depends on cultivating *resource fluidity*. This state is attained and applied over a three-phase process = (see Figure 1). First, in the **identification** phase, the NFP organization should seek to gain access to resources with polymorphic potential, which allow them to be interpreted and repurposed for diverse DT needs later. Second, in the **activation** phase, the resources are mobilized and readied in response to external triggers, such as opportunities and threats posed in the broader society, and reconfigured for DT purposes. Finally, during the **application** phase, mission-driven governance structures are installed and enacted to allocate and deploy resource fluidity across diverse operational domains of the NFP organization to address its DT needs.

Phase 1: Identification

Identification refers to the phase for the NFP organization to strategically locate and gain access to the resources necessary from its internal and external resource networks for initiating and sustaining DT. As with many NFP organizations, CIC's DT resource base is primarily constituted of resources voluntarily contributed for free or very low cost by their network, including tangible and intangible resources. As Informant #1 explained, "*the church hasn't risen and fallen on paid staff. The church has risen and fallen on passionate volunteers.*" The strong reliance on voluntary resources led to a **transient resource access** to what is required for their DT initiatives. When Informant #2 explained their process of getting access to IT personnel for DT expertise, she stated, "*the first thing they need to do is ask if there are people in the congregation who would like to speak into this area because I bet that there would be.*" However, CIC did not have ownership over such resources, as they could be withdrawn or made unavailable at any time, as what Informant #2 continued to raise, "*The challenges are that they could up and go any time.*"

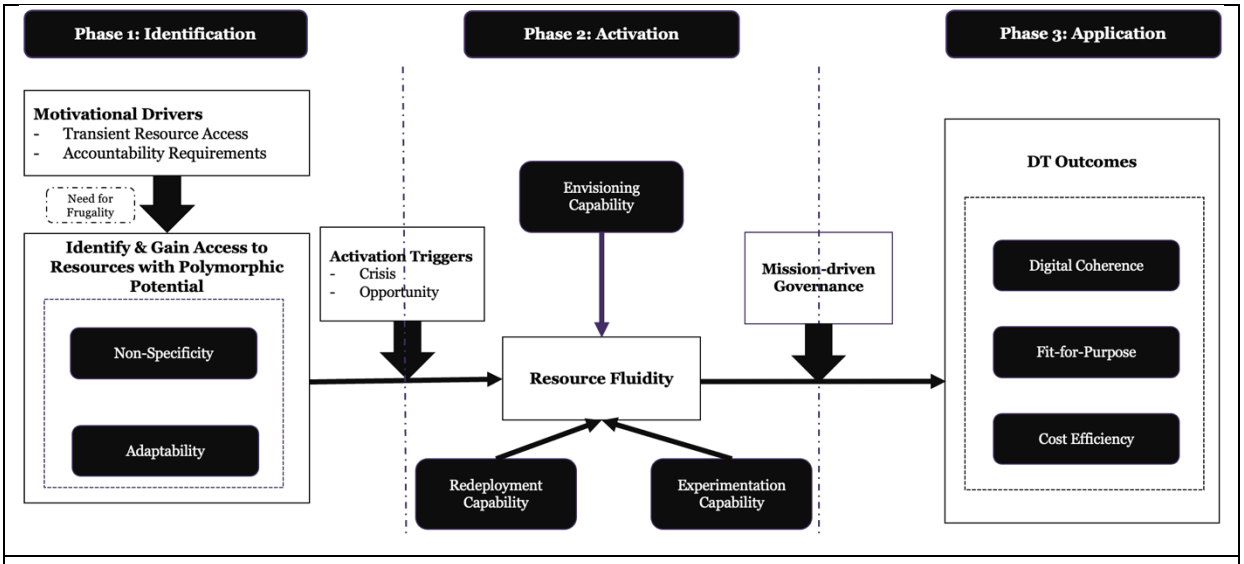

Figure 3. Process Model of Resource Fluidity for DT in NFP Context

As a result, CIC also had to be mindful of its **accountability requirements** because they are especially reliant on the goodwill of the resource owners and their decisions about resources. As highlighted by Informant #3, who explained:

> *"We use a lot of volunteers…we just gonna make sure we always keep the culture that we care about the people…It's probably one of the biggest things."* Informant #4 further highlighted, "*even a church of our size, the vision is always much bigger than the resource…we are constantly battling. Because often most of their income is using donations, and we're trying to be good stewards of everything that God blesses us with through his faithful people*."

Thus, transient resource access and accountability requirements form the motivational drivers that underpin a **need for frugality**, which require CIC to maximize the exploitation of transient access to resources. As explained by Informant #1: "*We don't necessarily have the luxury of being able to staff everything we do*."

To align with the need for frugality, CIC strategically sought to **identify & gain access to resources with polymorphic potential.** Adopting the biological concept of *polymorphism* (Ford 1945), we define resources with polymorphic potential as those that can take on multiple forms and be deployed for different purposes according to varied objectives of an organization. Our findings suggest that resources with polymorphic potential present two distinctive features. Firstly, **non-specificity**, which refers to the general-purpose nature of the resources, without firm/industry-specific usage characteristics (Sohl and Folta 2021), making them readily transferable. In the context of DT for NFP organizations, our data revealed that communication and collaboration platforms, such as Zoom, Messenger Rooms, Facebook, and other readily available tools were adopted quickly in responding to the strategic shift to DT because of their non-specific design for

communication, Informant #9 explained the smooth transition of worship services from offline to online using Facebook Groups:

> "*Facebook groups really held the campuses together, and it was a great way to communicate to our people. We would stream our Sunday services into there... keep that community going within those Facebook groups. So that was a real key part to our marketing, and just keeping our congregation connected.*"

Secondly, **adaptability** is often embedded in such resources, which means that the resources can be easily modified. This adaptability may stem from deliberate reshaping or repurposing the resources, or from the resource's inherent capacity to flexibly self-adapt to meet the changing needs for DT (Tuominen et al. 2004; Weigelt and Sarkar 2012). In our case, both technological and human resources critical to CIC's DT initiatives demonstrated this quality. For instance, CIC's IT & Production Technician (Informant #3), who was largely *"self-taught"* in digital production and management, explained the importance of rapid learning and passing on the knowledge to employees and volunteers of the organization to quickly respond to the disruption brought on by the pandemic lockdown:

> *"I know how to learn something really quickly and then able to teach people simple as well. I can take something that's really complicated to make it simple.... I just love learning and teaching, so like passing on my knowledge and I'm not holding it on to myself."*

The resources with polymorphic potential (including employees, volunteers, software, and equipment) identified and accumulated by CIC were subsequently mobilized for use in the next Activation phase.

Phase 2: Activation

Activation is defined as a process through which resources are transformed into "independent actors" with the ability to develop, "direct and combine" their own resources (Harrison and Håkansson 2006, p. 231). More specifically, our finding suggests that the activation phase can be triggered by either a **crisis** or an **opportunity** that creates an awareness of an anomalous state and the need for organizational action.

In the case of CIC, the surge in social media use and digitalization was perceived as a significant opportunity to expand its outreach. As Informant #4 recognized:

> "*The world is online, and we're crazy if we don't see that as an opportunity… rather than shaking people to come to the church and expecting them to walk in our doors. Let's go to them.*"

However, the immediate impetus for CIC's DT was the onset of the global pandemic, which triggered an extended emergency lockdown across New Zealand. Informant #2 described the urgency, "*In the church office, we had just literally 2 days before the lockdown announced.*" Such urgency demanded an improvised and immediate response by CIC, given that its services constitute a vital part of the community's daily life, particularly during the times of crisis, to accommodate the "*angst and worry and disappointment and nervousness noisy*" [Informant #2]. Informant #10 described the rapid mobilization effort:

> "*When we first went into lockdown, our original setup was like the night before. Lockdown was about to start. I'm not sure just means that we pretty much drove around to about four locations and sit up many studios at musicians' and vocalists' houses, so that they could live stream from home for our Sunday services."*

Similarly, Informant #8 reflected on the "*kids' church*":

> "*We always know that there's children that haven't had the opportunity to receive teaching about god…It makes sense to try get on a platform with the children are so that they can have opportunity to know that part from their own homes*."

However, the "*major shift to bring us [the children ministry] online*" required "*a massive learning curve*," and was forced by the immediacy of the lockdown:

> "*Wednesday was the day they called a lockdown. And just a day before, we just started fishing out what a program could look like online if we went online. Then the next day we just had to do it.*"

Our findings reveal that CIC's sense of urgency, which was driven by the abrupt nature of the pandemic and its significance in its local communities, necessitated the rapid mobilization for digital solutions across ministries, even without prior strategic DT planning.

In responding to the urgency, our findings also suggest that three types of organizational capabilities are crucial for achieving **resource fluidity**, a state in which the polymorphic properties of previously identified resources are primed for flexible deployment subsequently. Resource fluidity enables the organization to address the dynamic tensions between stability and change during the process of activation by accommodating the "deep-seated texture of relations, rules, habits, cognitive frameworks" (Lanzara 1999, p. 334) in which organizational actors routinely engage. These three capabilities are essential to flexibly mobilizing DT resources under conditions of uncertainty and frugality.

First, the management team requires an **envisioning capability,** which is defined as the ability to strategically see the potential usage and different ways of deploying their resources in alignment

with the broader organizational vision and mission. This capability involves not only imagining the ideal future states and opportunities for DT but also providing guidance for efficient resource allocation and coordinated action in the short and long term. At CIC, this capability was evident in how leadership approached the pandemic lockdown. A senior pastor (Informant #1) explained their urgent envisioning of new modes of services through digital means:

> "*When we first went into a lockdown…no one knew what was gonna happen. We sat down as a team and had a look at every area of the church generationally and said how we best going to reach these people, how we best going to help them. We looked at the older generation and we came up with a strategy to not only just trying to push them online, but actually to 'can we help them with devices to help them get online?'"*

Moreover, the IT Manager (Informant #2) and Creative Director (Informant #4) at CIC both illustrated how envisioning capability was also exercised with a longer-term perspective for efficient infrastructure-building and DT vision, laying the groundwork for sustained DT initiatives.

> "*Traditionally in churches, production environments are very separate from IT and that's not always good. It can see a double speed, especially in the area of network switching and storage. Media and TV produce a lot more content that needs to be stored than office environment does. So they have different needs. They require different speeds. And coming into this role, I was able to just be aware of that and put that on the list of things to work with. They also have particular software that doesn't respond well to being locked up…We just finished on this day, we just finished the full migration from one domain to another and all the infrastructure."*
>
> *[Informant #2]*

> *"We've gone up another level to actually now consider this an online campus. That's it's quite a philosophical shift. That's not just like, 'hey, this online streaming of our services for all those who are away this week… it's a different focus now. It's 'hey, here's church happening online and it's for people that have never been to our church before'…we see this very much a gateway into our physical locations."*
>
> *[Informant #4]*

Second, there is a need for a **redeployment capability** that enables the NFP organization to flexibly repurpose and recombine its non-specific and adaptable resources to meet its specific and evolving DT needs. This capability is particularly important in contexts of frugality and uncertainty, where resources must be mobilized quickly and efficiently without transactional purchases. At CIC, the redeployment capability was evident in the prompt and creative use of existing human, digital, and material resources to meet emergent demands during the pandemic. For instance, a customer relationship management (CRM) system implemented with a volunteer's help became a *"godsend"* (Informant #1), and was repurposed to track check-ins for safety compliance during the pandemic, providing a "*wonderful sign-in system*" (Informant #1), to accommodate the accountability to government requirements.

The redeployment capability was also evident in the flexible reallocation of human resources, including paid employees and volunteers. For example, Informant #10 described how a full-time pastor "*runs into being an online campus pastor***,**" whose role "*changed a lot to becoming an online campus partner*" to oversee the online campus and CIC's digital presence, and ensuring it aligns with CIC's envisioned DT trajectory. As Informant #3 elaborated,

> "*Pastor XX [anonymized] actually runs the online campus…He communicates to all those people that are joining them online. So we've actually got people around*

New Zealand now, and even some people around the world…it's outreaching to people that actually don't attend church at all."

Similarly, the volunteer base was rapidly mobilized to bridge digital skill gaps and support CIC's community continuity. Informant #1 recollected,

"*We had a volunteer...put a training video together to show people how easy it is to show the hub leaders how easy it is to actually facilitate a Zoom meeting. And they did a step-by-step video to help them actually overcome, particularly in the first lockdown, when everything was crazy, to give them a sense of calm that 'you can still do that.' And so our hub leaders actually took the hubs online.*"

Finally, an **experimentation capability** is required to enable the NFP organization to "probe, experiment with, test," (Chang et al. 2012, p. 445) and effectively execute its customized ways of repurposing and redeploying its resources in alignment with its envisioned DT goals. Our analysis revealed that this capability supports low-cost innovation that is particularly important in resource-constrained contexts. As Informant #3 illustrated,

"*We always make sure we try and aim for everything to be excellent, but we are also always tight on budget, so we always make sure like there's a cheaper way to do something with something else, like a different software…We figure out how we can manipulate the software…We do a lot of research, and we use free trials and just try and do things… and we just play around, and we make mistakes, and we learn, we try and grow, we try and... Yeah, there's always things that the software is not designed to do.*"

As a result of exercising the envisioning, redeployment, and experiment capabilities, the NFP

organization is able to mobilize its previously identified resources in a flexible and responsive manner for DT. In doing so, it activates a state of resource fluidity, which can be strategically leveraged to support effective and adaptive DT outcomes in contexts of frugality and uncertainty.

Phase 3: Application

Finally, to produce tangible DT outcomes that align with the frugality and mission-driven objectives, our findings suggest that the activated resource fluidity should be strategically leveraged in the application phase. This phase involves the deliberate allocation of mobilized resources toward new processes, technologies, and services that reflect the organization's core mission while remaining cost-effective.

Our case revealed that the activation phase requires **mission-driven governance** to guide the loosely planned, yet highly responsive navigation of DT. As Informant #4 explained:

> *"Our church has grown and with our emphasis on the creative art atmosphere…but we have to balance that it doesn't just become a show…that we lose the essence of the message…We want to reach people…create a place that young people are inspired at and are attracted to…so we're constantly trying to balance that.*"

This quote illustrates that mission-driven governance at CIC operates as a balancing mechanism to ensure that the digital pursuits do not eclipse the organizational spiritual mission. Under the governance, resource fluidity is deployed across the organization through decision-making processes guided by the governance framework. These deployments are subsequently managed and flexibly adjusted to ensure effective outcomes of DT are produced. In this phase, resource fluidity is applied towards the realization of three primary outcomes.

First, resource fluidity is distributed and leveraged to ensure **digital coherence**, which is defined as the consistency of digital-oriented outreach and connecting strategies across various ministries to reflect and reinforce its spiritual vision. At CIC, this coherence was intentionally crafted to ensure the DT initiatives serve ministry goals rather than displace them. As Informant #8 explained:

> "*The use of IT and computers was not just for administration tasks and the running of the practicality of the church, but also in creating content, and housing the systems that were put in place to create things that we would call creative mediums to build atmosphere…. All the IT systems that go into all the derby products and editing software and video cameras and… all those systems we implemented here because we have a heart to use media as outreach to reach the world*".

Second, the resources being deployed are aimed at being **fit-for-purpose**, to avoid waste and optimize the wide pool of resource fluidity for DT initiatives. CIC actively sought to allocate the "*passionate person*" who "*is going to have the stickability to pursue that training*" (Informant #2), and support the DT initiatives. Informant #2 explained it with the example of building a database for its "CRM migration" and explained its success only after "*people constantly understanding the value of the database.*" Meanwhile, CIC was utilizing the "*pockets of knowledge*" possessed by its fluid resource pool to identify the right volunteers, as illustrated by the Creative Director, "*We're very big on using the skills that we have for a lot of people that work in IT or in the creative arts.*"

Moreover, CIC deliberately differentiated the tasks allocated to volunteers and paid staff to maximize its resource output while balancing the frugality needs and organizational mission. Informant #2 illustrated,

> "*My push to finance is the key infrastructure of the church that make up our*

network… enterprise level network… was a big burden for a volunteer in a full-time job to have any form of responsibility for…the volunteers, come in and do the additional things or project things that we do when they're available."

Third, the deployment of resources allows the focal organization to realize **cost efficiency** to "run as lean as" possible (Informant #1), which is critical to address the need for frugality in NFP organizations. Our case of CIC revealed that the cost efficiency is made possible through the extensive and strategic leverage of volunteers who are united by a shared spiritual mission, which constitutes a critical part of its activated resource fluidity. Informant #8 explained the how the mission alignment fosters sustained volunteer engagement:

"*Any church really provides people with that kind of opportunity. It makes their life bigger than just their world…people feel like being part of the family and they want to be a part of helping make the place technological…And people just love being a part of it, whether it's out there or working on something in here or upgrading.*"

He went on with an example to illustrate how volunteers contributed to enhancing CIC's digital presence:

"*Not everybody has the ability to have a team of graphic designers… if you want to speak to people. You don't have to any more just wait for them to be at your church from between 10 and 11 and on a Sunday. We can speak to them through platforms like social media. So we are able to create graphics and just have a basic handling of some of those products.*"

This is of particular significance to NFP and resource-constrained organizations because the enactment of DT tends to require substantial investments in human, capital, and technological

resources, which these organizations typically do not own outright (Kioko and Musau 2020; LaChapelle and McCool 2005). By fully leveraging the mission-driven motivation of volunteers, CIC demonstrates how cost-effective DT can be realized without compromising on quality or reach.

3.5 Discussion

This study explores how NFP organizations locate and mobilize resources necessary for DT without mandatory ownership. Through an in-depth qualitative case study of City Impact Church, we developed a process model of resource fluidity, explicating how NFPs can strategically (1) identify, (2) activate, and (3) apply transient resources for DT purposes and generate tangible outcomes that align with their mission while effectively managing resource constraints arise from external dependence and accountability concerns. In the following section, we discuss the theoretical and practical implications of our findings.

3.5.1 Theoretical Implications

Rethinking Resource Mobilization for DT in NFP Context

As stated in the earlier sections, the existing DT literature predominantly accounts for the for-profit context, with the implicit assumption of resource ownership and control by the organizations undertaking DT (e.g., Reinartz et al. 2019; Tumbas and Berente 2018). This ownership-centric view is grounded in previous theories such as RBV and dynamic capabilities (Barney et al. 2021; Teece 2016) that highlight the accumulation, integration, and leveraging of firm-specific resources (Barney et al. 2021; Teece 2016) through strategic planning (e.g., Hess et al. 2016), proprietary systems (e.g., Karimi-Alaghehband and Rivard 2019), specialized staff (Tumbas and Berente 2018), and dedicated digital infrastructure (e.g., Korhonen and Halén 2017).

While resource fluidity shares the conceptual ancestry with RBV and dynamic capabilities, it diverges in both its assumptions and focus. Whereas RBV emphasize the possession of rare, valuable, inimitable, and organized strategic resources to sustain competitive advantage (Barney et al. 2021), resource fluidity describes the fluid access and deployment of non-owned resources that are transient and often not controlled by the organization, turning NFPs' strong resource dependence on external pools from an inherent limitation (Malatesta and Smith 2014) into a unique resourcing strength of NFPs.

Similarly, dynamic capabilities are higher-order organizational routines that sense, seize, and transform by orchestrating changes (Teece et al. 2016; Winter 2003), whereas resource fluidity represents state and practices of reconfiguring the malleability of accessible resources themselves. Through resource fluidity, resources remain mobile, polymorphic, and easily recombined across organizational boundaries, reflecting adaptability rather than routinization that is significant in dynamic capabilities.

Our findings challenge this fundamental assumption by introducing and theorizing *resource fluidity* as a critical state spanning identification, activation, and application phases that provides a crucial process for NFPs to overcome inherent resource limitations (Malatesta and Smith 2014) for DT purposes. Specifically, mission-driven NFPs like CIC rely on polymorphic resources with non-specificity and adaptability to enable flexible and cost-efficient DT. Our findings align with prior literature on frugal innovation (Weigelt and Sarkar 2012), but extend it by demonstrating how NFPs systematically identify and leverage such resources through transient access and flexible arrangement rather than ownership. For instance, unlike for-profit firms that invest in proprietary technologies and specialized experts, NFP organizations should prioritize general-purpose and adaptable tools and resources (e.g., communicative social media platforms) that could

be rapidly repurposed across ministries. Deliberate identification of these resources facilitates rapid redeployment, experimentation, and alignment with the envisioned DT journey for subsequent activation of resource fluidity and its application. This reconceptualization positions resource mobilization not as an internal accumulation problem, but a flexible coordination challenge shaped by contextual accountability, community engagement, and mission alignment, which are critical for NFP organizations (Chen et al. 2020; Hyndman and McConville 2018). In doing so, this study extends the applicability of DT frameworks beyond asset-heavy, ownership-driven organizations to encompass agile and network-dependent organizational forms.

Extending DT Research in Mission-Driven, NFP Context

Second, this study contributes to the emerging literature of DT in NFP contexts by identifying *mission-driven governance* as a critical mechanism for balancing DT initiatives, resource frugality, stakeholder value alignment, and accountability management. Mission-driven governance acts as a key differentiator in guiding resource allocation in NFP contexts from for-profit organizations. For-profit firms typically allocate resources based on anticipated return on investment - even when claiming being mission-driven – their mission "get subsumed by the profit motive," In contrast, NFPs allocate resources under a different logic where decisions must reconcile frugality, accountability, and social mission fidelity (Chen et al. 2020; Hull and Lio 2006). In particular, under resource-constrained conditions, this governance logic becomes critical in pursuing DT needs without compromising the organization's core values.

Our findings show that mission-driven governance in NFP organizations functions as a structural anchor that shapes how resource fluidity is applied in ways that align with organizational missionary commitments while fostering DT. Rather than rolling out DT initiatives for efficiency or scale alone, NFP organizations need an emphasis on value-consistent application of resources,

where DT decisions are made upon organizational mission, such as spiritual guidance and community connection in the CIC case. This form of governance, as revealed in our case, is not bureaucratically rigid, but rather supports a loosely planned DT trajectory with tight values, providing the focal NFP organization with directional guidance while also allowing flexible execution.

Three critical DT outcomes should emerge as results of effective mission-driven governance. First, mission-driven governance on applying resource fluidity ensures *digital coherence* by aligning the DT initiatives with the organization's mission. Our study revealed that DT in NFP contexts does not always aim to automate or replace existing procedures, but to extend them via digital means for achieving the organizational mission. Second, mission-driven governance facilitates *fit-for-purpose* application of resource fluidity by aligning the polymorphic resources with the appropriate roles and functions. This includes distinguishing DT initiatives that require stable oversight and those that can be flexibly assigned to skilled volunteers. This target allocation ensures that the limited and transient resources are not overly extended, but all contribute effectively within their capacities for sustained resource pooling. Finally, mission-driven governance supports *cost efficiency* through purpose-aligned engagement. By leveraging the intrinsic motivation of human resources tied to a shared mission,NFPs can attract and sustain volunteer labor and community partnerships to reduce the financial burden of DT. NFPs can draw on relational capital and collective commitment to advance their DT capabilities and progress in a sustainable way (Eikenberry 2008).

3.5.2 Practical Implications

Beyond its theoretical contributions, this study also has several practical implications. First, for NFP organizations, our study highlights the importance of shifting the focus from long-term

resource acquisition to strategic access and flexibility. NFP organizations could shift their traditional view on their reliance on non-owned resources, such as voluntarism and donated resources as a resourcing challenge (Runge 1984; Shin and Kleiner 2003) towards perceiving it as an opportunity for effective DT enactment in such a setting. Specifically, NFP organizations should invest in mission-based resource identification and prioritize polymorphic resources, such as cultivating volunteer expertise, community donors, adaptable platforms, and multi-skilled staff, over specialized investments. Leaders of NFP organizations should also focus on developing effective governance frameworks that align with the organizational mission while also allowing flexible mobilization and execution of DT initiatives. In the longer term, by effectively activating and applying resource fluidity through the prescriptions provided by this study, these organizations will be able to subsequently enact effective DT and "sync with the contemporary world" (Kioko and Musau 2020, p. 74)

Second, this study also benefits the diverse ecosystem partners of NFP organizations, including government agencies, technology providers, and donors, who are seeking solutions to DT in various organizations that differ in terms of their resources on hand. For this group of stakeholders, this study serves as an empirically grounded source of prescriptions, suggesting the need to support NFP organizations through resource-sharing mechanisms, training hubs, and grant models that account for dynamic access needs rather than capital-intensive investments. This can be especially important for NFP organizations and the broader resource-constrained contexts because the shortage of supporting resources remains a problem for many organizations despite the broader societal trends towards a digital age (Mandviwalla and Flanagan 2021).

3.5.3 Limitations & Future Research

This study is not without its limitations. First, although the single case research method adopted in this study is a "typical and legitimate endeavour" (Lee and Baskerville 2003, p. 231) in qualitative IS research, our findings and theoretical framework may not be generalizable to all NFP organizations. As such, future research could be centred on extending and validating our emergent framework with the collection and analysis of additional data across various NFP organizations, such as NGOs and charities, as well as a variety of stakeholders (e.g., volunteers, system vendors, and sponsors) to span the boundary conditions and implications of our framework in greater depth.

Second, the empirical setting of this study was shaped by the extreme conditions of the COVID-19 pandemic, which introduced a heightened sense of urgency and improvisation in DT decision-making. While this context enabled the observation of rapid resource mobilization under extreme constraints, it may not fully reflect the dynamics of DT in more stable, long-term environments. Future longitudinal research could investigate DT of NFP organizations in non-crisis conditions, including how resource fluidity is maintained, institutionalized, or diminished over time.

3.6 Conclusion

In summary, this study advances the existing DT scholarship in the NFP context by theorizing how organizations without ownership of strategic resources (Barney et al. 2021) can initiate, navigate, and sustain DT in a loosely planned manner. Through a grounded case study of a large faith-based organization, we developed a theoretical framework that conceptualizes resource fluidity as a critical state, enabled by the identification of polymorphic resources, activated through improvisational capabilities, and strategically applied through mission-driven governance. In doing so, we respond to the calls for context-specific theorization of complex socio-technical phenomena (Davison and Martinsons 2016; Venkatesh 2025) like DT and extend the existing

prescriptions that often assume stable and owned resources typical of for-profit settings. Our findings shed light on how NFP organizations can effectively mobilize transient resources to meet dynamic needs for DT, while staying aligned with their social missions and operating under frugal conditions. In doing so, this study offers novel theoretical and practical insights for researchers and practitioners seeking to understand how DT can be enacted in mission-driven and resource-constrained environments.

Chapter 4: Knotting Activism – Digital Transformation of the Media System for Social Justice

Abstract

The digital transformation of the media system has fundamentally reshaped how activism emerges and evolves. Drawing on the Ingoldian conceptualization of knotting and action lines, this study examined how diverse media action lines, including those of professional journalism, traditional media outlets, digital platforms, victims, and public engagement, within an increasingly converging and digitalized media system interweave to generate activist momentum. Using an in-depth qualitative case, the Post Office Horizon IT Scandal – known as the biggest miscarriage of justice in the UK - we trace how various action lines interwove to produce two distinct forms of knotting: (1) *Concentrated Knotting*, marked by rapid but short-lived surges in visibility, and (2) *Compound Knotting*, featured by sustained, layered, and recursive interweaving across the media terrain to sustain and amplify the longitudinal pursuit of justice. Our study reveals how activism is an emergent, dynamically generated, and temporally situated process of knotting, where activist momentum is not enacted by bounded entities but through ongoing correspondences within a transforming media system. We contribute to research on the digital transformation of media systems and media convergence, as well as digital activism by theorizing social justice movements as a temporally conditioned cultivation process rooted in ongoing, interweaving, and recursive interplay of narrative, visibility, and collective mobilization within the lived media system.

4.1 Introduction

With the ongoing digital transformation of the media system that incorporates unregulated social media channels, live streaming, and algorithmic news delivery (Giertz et al. 2022; Martens et al.

2018), news production, distribution, and consumption have become increasingly dynamic, fluid, and participatory (Jenkins and Ito 2015). Rather than functioning as a fixed, mainstream-outlet-led structure (Meraz 2009), the media system today is better conceptualized as a living meshwork in motion (Ingold 2016b), where stories and actions move along entangled trajectories. As traditional and digital media converge, overlap, and co-evolve (Chadwick 2011), and as boundaries between them blur, the media system becomes increasingly converging (Meikle 2011), continuously reshaped through intersecting currents of journalistic practice, public discourse, and digital technologies. This ongoing convergence of the media system not only alters how news circulates but also redefines the conditions through which activism and collective action emerge, persist, and gain momentum (Pentina and Tarafdar 2014).

Within this evolving landscape, public participation in activism increasingly flows through digital channels (Bennett and Segerberg 2012). Much of the existing literature has emphasized the empowering role of digital media, particularly social media platforms, in amplifying public voices and enabling networked mobilization (e.g., Selander and Jarvenpaa 2016; Venkatesan et al. 2021). Under this backdrop, journalism and traditional news outlets have been changing with new business models and embracing participatory news practices across platforms (Deuze 2007; Loosen and and Schmidt 2012). However, less attention has been given to how the journalistic practices have evolved not merely as static integration or as a network but as evolving forces within this transforming media system, that are interweaving with the shifting news circulation, the shaping of public attention and discourse, alongside the momentum of collective engagement. This presents a significant gap in understanding how the broader media system, in its converging and dynamic form, not as networked entities, but as interweaving forces, contributes to the unfolding of social activism in the digital era.

To address this, we adopt Ingold's (2015) conceptualization of *knotting* and *action lines*, to shift the view of socio-technical phenomena from as the outcome of discrete, bounded actors to unfolding lines in motion that interweave, diverge, and converge over time. Rather than viewing journalism, technology, or the public as bounded entities, Ingold's perspective allows us to trace how their correspondences, which are the co-responsive interweaving of action lines (i.e., correspondences, Ingold 2015), give rise to potential new possibilities for action. It helps surface the provisional, volatile, and often unpredictable nature of how narratives develop, gain traction, and may help explain the direction towards social movements. In this way, the media system is understood not as static, institution-grounded, but as moving action lines shaped by professional journalism, traditional news reporting, technological mediation, collaborative practices, evolving public engagement, and their interweaving. This perspective allows us to capture the temporal and relational complexity of the contemporary media system. Following from these, the driving question of the study is: *How do evolving action lines within a digitally transforming media system and their correspondences shape momentum for social activism?*

We studied these dynamics of the case of the Post Office Horizon IT scandal in the UK that spanned more than 25 years. This case has been called the most serious miscarriage of justice in the UK (Wallis, 2021), where more than 900 subpostmasters were wrongly prosecuted between 1999 and 2015 because of incorrect information from a computer system called Horizon. Hundreds of victims and journalist had been struggling to gain public awareness and engagement in the scandal for over two decades. What makes the case relevant to our study is how sustained media efforts reconfigured the conditions for public awareness, outrage, and collective response in an evolving media system.

Through Ingold's perspective and notion of knotting, our study revealed two distinct yet interconnected knotting processes - concentrated knotting and compound knotting – which illustrate how evolving lines of action within the media system interweave to shape the momentum of activism through different forms of correspondences. In doing so, this study contributes to reimagining the media system as being at the state of becoming, which transcends traditional organizational boundaries through the interweaving of multiple practices: investigative rigor, comprehensive reporting, digital mobilization, and public engagement. Moreover, the study contributes to the literature on the digital transformation of media systems and digital activism by expanding understanding through knotting and correspondences of moving media lines in motion that shape the temporal dynamics of activist momentum.

4.2 Literature Review

4.2.1 Media Convergence & Digital Transformation of Journalism

Media convergence is widely recognized as a defining feature of the contemporary transforming media landscape, shaped by the blending of technologies, the media industry, and cultural practices (Dwyer 2010; Meikle 2011). It is broadly defined as "a situation in which multiple media systems coexist and where media content flows fluidly across them," (Jenkins 2006, p. 322). This convergence reflects a multi-faceted process that involves both technological developments, such as digitalization and platform integration (Newman and Levine 2012), and transformation in industrial and audience practices regarding how media content is produced, distributed, and consumed within an evolving media system (Dwyer 2010; O'Sullivan and Fortunati 2021).

Early conceptualization of media convergence was grounded in technological integration, particularly as media content moved across formerly distinct "terminals," such as telephones,

televisions, and personal computers, through various “pipes” across increasingly networked platforms (i.e., technological convergence - Borés et al. 2003, p. 2). Digitalization and internet proliferation accelerated the shift, enabling unified content production and dissemination across print, broadcast, and digital formats, with the media system increasingly embedded within a digital ecosystem (Dwyer 2010; Latzer 2013). Building on this, existing literature on technological convergence also traced its implications on the digital transformation of journalism, pointing to new forms of storytelling and content delivery (Deuze 2007; Pavlik and McIntosh 2011), particularly with the interactivity and multimedia enabled by digital platforms (Robinson 2012).

However, media convergence extends beyond technological integration. Jenkins (2006) argues that media convergence “represents a cultural shift” (p. 3), wherein audiences are no longer passive recipients but active participants and producers in shaping media narratives, highlighting that it is also a cultural and participatory process (i.e., cultural convergence - Jenkins and Deuze 2008). The process of cultural convergence reconfigures the roles of audiences and traditional media producers (e.g., journalists, mainstream media outlets), blurring the boundaries between media production and usage (i.e., 'produsage' - Bruns 2008). That is, audiences increasingly take on productive roles by creating, editing, and distributing media content across networked platforms, engaging in collaborative, iterative, and participatory media practices (Bechmann and Lomborg 2013; Jenkins 2013). Meikle and Young (2012) underscore how such convergence is embedded in everyday communicative practices—how people tell stories, engage in dialogue, and mobilize around shared concerns in digitally mediated contexts.

This participatory shift is closely intertwined with the *industrial convergence,* where technological and cultural convergence have pushed legacy media firms to strategically reconfigure firm boundaries to change the silo industry structures (e.g., of broadcasting, telecommunications,

publishing, and IT industries; Borés et al. 2003; Dwyer 2010), and adopt cross-platform strategies to remain competitive (Doyle 2010). Such convergence also requires legacy media firms to restructure internally by breaking down departmental silos, repurposing content across channels, and retraining workers for digitally networked tasks (Deuze 2007; Dwyer 2010). In this context, Bruns' (2008) notion of 'produsage' is extended to apply not only to the audiences but also to media professionals, such as journalists and traditional media companies, who increasingly adapt to and incorporate participatory journalism practices, such as live engagement, collaborative investigations, or user-submitted content (Hermida 2010; Loosen and and Schmidt 2012).

These convergent processes led to the emergence of a converging *media system*, which is a terrain where communicative processes are shaped by the constant interplay of old and new media logics, technologies, and practices (Chadwick 2011; Chadwick 2017). In a converging media system, traditional hierarchies of media authority are destabilized and redistributed across a networked public sphere (Reese 2020). In this context, professional reporting and media outlets, rather than operating as a fixed institutional authority, function as a flexible and evolving set of practices that are continuously reshaped by interactions with audience participation, technological affordances, and practices of each other (Hermida 2010; Reese 2020). As a result, the converging media system is marked by increased participation, decentralization, and contestation (Reese 2020).

4.2.2 Social Media and Digital Activism

Activism, broadly defined as efforts and movements to drive societal change – whether through challenging dominant representations, advocating for marginalized voices, or altering public policy – has traditionally relied on collective mobilization (Della Porta and Kriesi 1999; Tilly and Tarrow 2015). Central to such mobilization is the (1) formation of collective identity and (2) communicative efforts to resolve social issues (Chon and Park 2020). The converging

transformation of the media system has significant implications for activism. In the digital era, professional journalism, user participation, and digital technologies are increasingly intertwining, and activism becomes embedded within evolving digital communicative infrastructures, particularly since the emergence of social media platforms (Chadwick, 2013; Jenkins et al., 2013). Rather than existing as discrete or external interventions, activist practices now emerge from within a dynamic and digital-enabled environment where activism is performed, mediated, and negotiated (Bennett and Segerberg 2012; Selander and Jarvenpaa 2016).

Social media activism is conceptualized as "a fundamentally communicative process that involves individuals' communicative actions to collectively solve problems" (Chon and Park 2020, p. 76) through interactions on and with social media platforms. Radin (2006) demonstrates how online activities such as the provision of peer support, the sharing of information, the response to queries, and the participation in projects constitute forms of activism, have been "planting the seeds of revolution" (p.600). Social media platforms, such as Twitter, Facebook, Instagram, and TikTok, function as dynamic communicative environments where individuals and groups coalesce around shared concerns, exchange information, and coordinate collective action.

Social media platforms extend the **connective possibilities** of activism by enabling rapid and scalable interaction across spatial and temporal boundaries (Papacharissi 2016; Tufekci 2017). Movements can now emerge from everyday digital exchanges, circulate through layered networks of, and gain visibility across both traditional and new channels of the converging media system (Bruns and Highfield 2015; Papacharissi 2010). For instance, in a study examining the Stop Online Piracy Act (SOPA) protests, Miranda et al. (2016) highlights how digital platforms facilitate public discourse to spotlight overlooked issues, mobilize a wider spectrum of the population to engage in discussions on the topic and have a voice, and propagate more evocative, attention-grabbing

messages. Apart from SOPA, in the past few years, an increasing number of high-profile digital activism campaigns have dominated the news and been studied by scholars as a way of demonstrating the potential of social media to produce activist behaviours and the impacts of these campaigns on society at large (e.g., Selander and Jarvenpaa 2016; Venkatesan et al. 2021).

This connective dimension of digital activism is not limited to logistical coordination but extends to reshape how **collective identities** for social movements emerge, sustain, and evolve within the communicative process. Through relational dynamics, such as tagging, reposting, commenting, and following, the continuous and iterative articulation of cause-related narratives is co-constructed and shaped across different participants (Jackson 2016; Papacharissi 2016). Such dispersed practices embed activism within the everyday interactions of digital users, integrating cause-based expression with personal and cultural expression (Jenkins and Ito 2015), which allows collective identities to evolve (Milan 2015). Despite the growing individual voices facilitated by social media platforms, collective identities are not replaced but amplified through the affordances for discourse and performance of social media platforms (Khazraee and Novak 2018). Several studies demonstrate how social media platforms simultaneously foster personal voices and collective identification. Gerbaudo (2024) illustrates how personal testimony campaigns are pivotal in digital-facilitated activism by enabling a collective storytelling to foster "crowd-sourced symbolic mobilisations" and "emotional overtones of indignation, compassion and collective pride" (p. 4905). In a similar vein, Milan (2015) conceptualizes digital-enabled activism as 'cloud protesting,' wherein politics of visibility mediated by social media foregrounds the identity-making, affective individual presentations and their co-presentation, which constitute a larger "collective we" (p. 896).

In sum, the ever-evolving converging media system dissolves the boundaries between grassroots expression and institutional response and is constitutive of new forms of collective identity, giving rise to a dynamic and distributed terrain of activism (Chadwick 2017; Treré 2018). Instead of solely being orchestrated by centralized actors or formal organizations, digital activism also unfolds through loosely connected communicative assemblages. Personal storytelling, emotionally resonant messaging, and everyday digital practices contribute to the circulation of activist discourse, often gaining traction through algorithmic amplification and social visibility (Papacharissi 2016; Uldam 2018). These dispersed yet interconnected acts of expression and coordination reshape how collective action takes form, enabling protest and advocacy to unfold across multiple nodes of engagement (Gerbaudo 2012; Treré 2018).

4.3 Theoretical Underpinning: Action Line & Knotting

We adopt the conceptual notion of *knotting* (Ingold, 2015) to investigate how digital transformation unfolds in dynamic sociotechnical contexts. Grounded in Ingold's (2015) conceptualization, we foregrounded the emergent, fluid, and dynamic nature of socio-technical phenomena (Baygi et al., 2021) by conceptualizing digital transformation as constituted through ongoingly moving lines (i.e., *action lines*). The action lines are diverging, converging, and interweaving (Ingold 2021b), which give rise to reality (e.g., digital transformation) that is unfolding. These action lines are not fixed trajectories with pre-defined goals or endpoints, but are created through continual moving, corresponding with others, and adjusting to open up new paths (Ingold, 2021a).

Aligning with Ingold's view, we define *knotting* as the process through which action lines interweave through *attuned movements* and *correspondences* – that is, ongoing relational adjustments in an unfolding shared field of movement (Ingold 2015). *Knots* produced through the knotting process are not endpoints (Ingold 2021a) but *opportune moments* of coherent gathering

of various attuned moving action lines, from where the lines continue to move and interweave. As Ingold (2015) posits, there are no knots (i.e., outcomes of activities) without the performance of knotting. Thus, knots are not fixed outcomes of the knotting process but are continually made and remade through correspondences among the moving lines. This perspective allowed us to reorient our research inquiry from viewing digital transformation of the media system as a process enacted by bounded, connected entities toward tracing the unfolding movements through which transformation emerges and unfolds. The conceptualization of knotting and action lines serves as our "sensitizing devices" (Klein and Myers 1999, p. 75) to attend to the *unfolding, situated,* and *relational* qualities of digital transformation in the media system. It shifts the analytical lens from fixed entities to unfolding action lines, revealing that socio-technical realities are in the continuous process of knotting. This lens is particularly valuable in digitally transforming media environments, where fragmentation, speed, and algorithmic modulation complicate linear explanation of activism emergence.

This perspective allows us to conceptualize IS phenomena as fluid meshworks of interweaving lines in motion (Ingold 2016b), and offers a dynamic lens for investigating how new possibilities for action emerge and how media systems digitally transform. That is, the performance of actions and the emergent phenomenon that is continuously unfolding are mutually constitutive (Baygi et al. 2021). This challenges static notions of action and calls for rethinking research practices and theoretical frameworks (Burton-Jones et al., 2021). Inquiry becomes an ongoing process of tracing these flowing trails to their full extent. With this perspective in mind, we must explore the 'strands of knotting' – that is, action lines - and their correspondences through which phenomena emerge and evolve (Ingold, 2021b). It is by tracing these strands that new narratives, pathways, and possibilities emerge.

Adopting Ingold's (2015, 2021b) perspective allows researchers to consider transitional moments and consequently to trace the historical evolution of action lines in shaping the phenomenon under consideration. In this study, we adopt Ingold's (2015) notion of *knotting* and the concept of *action lines* to analyze how momentum for activism is shaped and reshaped within the converging media system that is increasingly digitalized. Drawing on Ingold (2015), we impose a processual view of social justice development and conceptualize its pursuit as the knotting process, thus actualizing opportunities at timely moments to promote connectedness that consequently enables collective mobilization. From this view, we see activism not as an outcome of mobilization but rather as a process of actualizing and sustaining opportune moments created through correspondences of lines in motion. This influences our data analysis presented in the subsequent sections.

4.4 Research Methodology

4.4.1 Research Method

We conducted a qualitative research of an in-depth case study on the evolution of news reporting and media production on the Post Office Horizon IT scandal in the UK between 2009 and 2024. The Horizon system, a centralized accounting information system developed by Fujitsu and implemented in 1999 by the UK Post Office Ltd, became the basis for a national scandal. Following its rollout, many subpostmasters nationwide suffered unexplained accounting shortfalls due to the faulty Horizon system. Rather than investigating into the technical issues of the system, the UK Post Office prosecuted more than 900 subpostmasters for financial crimes based only on the Horizon system evidence, among whom hundreds were imprisoned, financially ruined, socially isolated, and traumatized.

Although the first public report to disclose the issue appeared in *Computer Weekly*, an industry magazine for IT professionals, in 2009, revealing seven wrongful prosecutions, the story initially gained little public traction. Since then, a fragmented mix of media reporting, including traditional news reporting and independent journalism blogging, continued to advocate justice for subpostmasters, yet public awareness in this issue remained limited. A critical shift of the case occurred in early 2024, after it was televised in a 4-episode drama entitled *Mr Bates vs the Post Office*, aired via broadcast and digital streaming, followed immediately by a documentary, during the 2024 New Year holiday. The drama and documentary, circulated widely across digital platforms via content sharing, triggered widespread social media mobilization, where algorithmic feeds elevated personal testimonies, curated outrage, coordinated calls for justice in this case.

The case was chosen for the following reasons. First, despite the scale of the injustice, hundreds of victims and a small group of investigative journalists struggled for more than two decades to gain sustained public attention. It therefore offers a compelling illustration of how digital media platforms, particularly social media, interplay with traditional journalism and media practices within a converging media system to amplify social movements for justice. Second, the case is appealing in terms of its narrative, evolving from a long-standing issue with limited initial visibility to a national scandal that captured widespread public attention. Third, its longitudinal and revelatory nature provides an ideal opportunity to trace how the different action lines within the media system converged at critical, kairotic moments to reshape public discourse and collective identity. In other words, the distinctive characteristics of the Horizon case position it as an "unusual revelatory" case (Eisenhardt and Graebner 2007, p. 27), offering a unique opportunity to address our research question.

Through the qualitative case study approach, we aim to develop a rich, contextual understanding of the dynamics underpinning how the digital transformation of the media system shapes the contemporary forms of social activism. Specifically, we adopted an interpretive approach rooted in empirical evidence, which facilitated the identification and analysis of new and unexpected findings as they emerged from the data (e.g., Leong et al. 2016) . Below, we detail our methods of data collection and data analysis procedure.

4.4.2 Data Collection

The researcher team first became aware of this case in 2021 and has since observed media practices by the institutional media, investigative journalists, and members of the public in shaping the prolonged trajectory of news reporting and public discourse. In early 2024, the research team began systematically collecting extensive secondary data from a wide range of archival sources published between 2009 to October 2024. These materials documented the evolution of the Horizon IT scandal and included 528 news articles published by *Computer Weekly*, and mainstream media outlets, such as Daily Mail, 487 journalism blog posts from *Post Office Trial* and *Post Office Scandal* sites (spanning 2018 to October 2024), 3445 public responses to the above blog posts (from November 2021 to November 2024), five digital documentaries and their scripts, 770 public inquiry reports and transcripts, seven YouTube videos made by investigative journalist Nick Wallis, and one published book detailing investigative efforts and the lived experience of victims of the miscarriage of justice. Collectively, these sources provided insights into the dynamics within the converging media system along the development of the 25-year-long scandal starting from 1999. In addition, we screened public responses to the journalism blog posts and social media activities, including Twitter posts created and reposted on the development of the scandal. Table 1 summarizes the data sources used to develop the storylines of the case. We excluded posts on

Twitter in the table since the number was not countable due to the limitations of the platform.

4.4.3 Data Analysis

Our analytical approach is grounded in the Ingoldian perspective (Baygi et al. 2021; Ingold 2015), which conceptualizes IS phenomena as emergent and processual rather than as isolated entities, events, or acts. Drawing on this perspective, we analyzed the data by tracing the evolving action lines that emerged within the converging media system and how they corresponded to give rise to distinct opportune moments that reconfigured the conditions for activism in the Horizon case. Through the conceptual lens of knotting and action line, the analysis took a narrative approach (Pentland 1999) and "an interpretation-centric approach and an inductive theoretical perspective" (Sarker et al. 2018, p. 914). The analysis consists of two stages:

First, following Ingold (2011, 2015), action lines form the trajectories of ongoing movement that ensure through time and whose unfolding and interweaving shape the becoming of a phenomenon. By immersing in the data, we traced activities that influenced the development and visibility of the scandal. As a result, five key *action lines* within the media terrain that formed the 'strands' of knotting (Ingold, 2021b). These include:

(1) **Traditional Media Outlets (TM)**: The action line is attached to the movements of established news organizations, such as *BBC News, The Daily Mail,* and *Computer Weekly*.

(2) **Investigative Journalists (IJ)**: The action line is traced after the work of journalists who actively investigated and reported on the scandal, including those affiliated with traditional outlets (e.g., Rebecca Thomson, who worked for *Computer Weekly*) and freelance journalists with investigative efforts (e.g., Nick Wallis).

(3) **Digital Platforms (DP)**: The action line encompasses a range of digital communicative channels, including social media platforms, blogging sites, and other websites (e.g., traditional media outlet sites).

(4) **Victimized Subpostmasters & Families (VI)**: The action line traces the actions attached to those directly affected by the scandal.

(5) **Public Engagement (PE)**: The action line captured the diverse forms of loosely connected individuals engaging with the scandal, such as collectively sharing and amplifying discourse.

Together, these action lines constituted an unfolding, converging media system that collectively and actively shaped how the scandal was understood, felt, and mobilized.

Second, following the analytical approach by Mozaffar and Candi (2024), we applied temporal bracketing (Langley 1999) to structure these action lines into flexible temporal periods without imposing rigid phase distinctions (Mozaffar and Candi 2024) to preserve the continuous and fluid developments of the media system. This allowed us to identify critical opportune moments when media action lines interwove, giving rise to the momentum that generated shifts in public visibility and advocacy. This approach aligns with our Ingoldian perspective by tracing how particular correspondences of action lines came together to produce heightened narrative and political momentum.

Our analysis revealed two critical momentum points, each marked by a distinctive form of knotting: *Concentrated Knotting* and *Compound Knotting.* These knotting forms that gave rise to the momentum illustrate how different action lines within the converging media system, through attuned movements and intensified interweaving, contribute to shaping conditions that drive collective mobilization and social movements. These findings are elaborated in the next section.

4.5 Findings

Guided by the Ingoldian perspective (Ingold, 2015, 2021b), our findings trace the converging media system, particularly with the emergence and integration of social media platforms, reshaping the dynamics of activism in the Post Office Horizon scandal. Rather than viewing activism as a top-down campaign driven by established media organizations, we conceptualize it as a knotting process (Ingold 2015), which is a continuous, evolving stream of interwoven movements shaped by the traditional and digital action lines of the converging media system in the UK. Within this, we identified two kairotic moments, each capturing a distinct form of how different media action lines knotted together to shape the momentum of activism through enhanced connection and communication. In our presentation of findings, correspondences of action lines are denoted in square brackets (e.g., [IJ1-TM1] refers to the correspondence of two action lines traced after movements of investigative journalists and traditional media outlets). Text in double quotation marks indicates the exact text or phrases extracted from our dataset, including different news reports, blog posts, the book, and comments from our secondary data sources.

4.5.1 Concentrated Knotting

In the early 2000s, subpostmasters affected by the Horizon system's faults remained voiceless, as "the one thing every Subpostmaster had in common was their isolation…Social media did not exist"[1]. A shift began in 2008 when *Computer Weekly* was contacted by two subpostmasters individually [TM1-VI1]. Recognizing the parallels between the two cases, journalist Rebecca Thomason was commissioned to investigate [TM2-IJ1], uncovering seven strikingly similar cases, which were published in 2009 and served as the initial knotting node of media practices.

[1] Flinders, K. (2024, November 21). Post Office Horizon scandal explained: Everything you need to know. *Computer Weekly*. https://www.computerweekly.com/feature/Post-Office-Horizon-scandal-explained-everything-you-need-to-know

Additional journalistic attention quickly coalesced after the initial report. *BBC Wales* reporter Sion Tecwyn and his camera operator, Graham Meggitt, soon sensed the richness of the Horizon cases and brought the cases to investigative journalists, [2, 3]Anna Marie Robinson and Bryn Jones [TM3-IJ2], who rapidly extended the investigation by contacting the initial victims and searching for new ones "all over Britain"[1]. Their work culminated in a Welsh-language documentary that aired at *BBC Wales* in September 2009, uncovering 36 cases with a "similar thread" [TM4-IJ3] [2]. The broadcast catalysed a new wave of affirmation and awareness among individual victims, leading to the first in-person meeting among the identified victims and to establish the Justice for Subpostmasters Alliance (JFSA) [TM5-VI2][2].

The knotting continued to thicken when journalist Nick Wallis was drawn into the process, through "a chance tweet" from the husband of a wrongfully prosecuted subpostmistress [DP1-IJ4-VI3][2]. Wallis initiated his investigation by quickly tracing back to earlier *Computer Weekly* and *BBC Wales* reports, building upon them with the support of JFSA [IJ5-TM6-VI4]. In February 2011, Wallis broadcast his investigation in English via two *BBC* regional channels, uncovering at least 55 victims [IJ6-TM7]. Viewer responses were immediate and powerful - "at least seven new victims" came forward "in less than seven days"[2, 3]. The newly identified victims were subsequently forwarded to the JFSA by Wallis, widening the growing connection of collective awareness and potential actions [IJ7-VI5].

However, the concentration did not sustain or further heighten. As quickly as the stories converged, several lines dispersed. As Wallis indicated in his book, "*My initial attempts to find anyone willing*

[2] Wallis, N. (2021). *The Great Post Office Scandal*. Bath Publishing.
[3] Bucks, S. (2024, March 4). How TV chipped away at Post Office lies. *Royal Television Society.* https://rts.org.uk/article/how-tv-chipped-away-post-office-lies

to take the Post Office story on failed... I was getting distracted by my day job..."[2] Meanwhile, language constraints limited follow-up to the *BBC Wales* team [3], and the absence of new developments led to a waning of attention. These setbacks illustrated not a breakdown of action lines but the undulation of flow, where the action possibilities pause, disperse, or follow a branching path (Ingold 2021a). Surrounded by these moments of fragmentation, a new path of investigative journalist engagement emerged through the sustained efforts of Karl Flinders from *Computer Weekly.* In ongoing correspondence with victims' action lines, Flinders "has led coverage of this continuing story" since 2010 to sustain the visibility of the scandal, while the other investigative journalists took a break from the scandal [IJ8-TM8-VI6].

This rapid, converging period, when action lines of investigative journalists, victims, traditional media outlets, and social media channels emerged and suddenly interwove to create a high-tension node of visibility, was followed by a slow, consistent reporting to carry forward the residual force of the initial momentum. This pattern represents what we conceptualize as a process of **concentrated knotting**. It is characterized by initial sparse movements of isolated voices suddenly thickened through interweaving with lines of media practices into an entangled node of collective awareness, collaboration, and narrative among small groups of activists (e.g., investigative journalists and victims). Yet, as quickly as a concentrated knot was formed, its intensity could not be maintained. The knotting process was loosened, with lines fragmented and dispersed, leaving only a few threads to continue weaving the scandal into public memory.

4.5.2 Compound Knotting

In contrast to the earlier momentum created through concentrated knotting, where visibility surged through rapid but short-lived correspondences, the second momentum was shaped by the sustained interweaving with various threads of the converging media system. As it is ongoingly digitalized,

the visibility, memory, and mobilization around the scandal were carried forward through recursive and layered interweaving across digital platforms, journalistic practices, public engagement, and traditional media outlets.

The *Computer Weekly* website [4], Nick Wallis' journalism blog sites [5], and the Horizon IT inquiry website [19] have created sustained channels that preserved and extended the scandal's visibility to the public [DP2-PE1]. Instead of acting as static repositories, these platforms acted as ongoing streams of information, tracking progressive developments, storing emerging evidence, and assembling analyses, which contributed to enriching and deepening the public's temporal and contextual understanding of the scandal. As living digital infrastructure, they allowed the public to return and re-engage with layered narratives.

This living infrastructure became particularly significant in early 2024, when the ITV drama *Mr Bates vs The Post Office* aired both online and via broadcast. The drama was produced through the interplay between long-form investigative journalism and traditional broadcast media, where journalistic findings were translated into a televised form that reached millions [IJ9-TM9] [6, 7]. The drama, grounded in years of journalism, crystallized the emotional and political stake of the scandal, sparking widespread public outrage and substantially heightened public awareness [IJ9-TM10-PE2][8, 9].

The momentum generated through the interweaving lines of investigative journalism, traditional

[4] *Computer Weekly*. https://www.computerweekly.com
[5] Wallis, N. *Post Office Scandal*. https://www.postofficescandal.uk/donate/
[6] Hutchings, M. (2022, December 7). Post Office scandal: Anglesey honours wrongly jailed sub-postmaster. *BBC News*. https://www.bbc.com/news/uk-wales-63879540
[7] Levison, J. [2024, January 7]. Mr Bates vs The Post Office consultant hopes 'net may be closing' on those responsible for Horizon IT scandal. *Sky News.* https://news.sky.com/story/mr-bates-vs-the-post-office-consultant-hopes-net-may-be-closing-on-those-responsible-for-horizon-it-scandal-13043180
[8] Village whipround saves postmistress from prison after she admits £36,000 fraud. (2008, February 8). *The Daily Mail.* https://www.dailymail.co.uk/news/article-512914/Village-whipround-saves-postmistress-prison-admits-36-000-fraud.html
[9] Martin, L. (2024, January 13). Mr Bates vs The Post Office: How a TV drama shook up Britain – in just a week. The BBC. https://www.bbc.com/culture/article/20240112-post-office-scandal-how-a-tv-drama-shook-up-britain-in-just-a-week

media storytelling, and dissemination was sustained, expanded, and reactivated through their correspondence with the digital platforms. Public engagement soon intertwined with journalistic practices and victims within the digitalized media system, where social media platforms like Twitter (X) and interactive blogging sites enabled the momentum to persist and intensify. On Twitter, real-time interactions about the drama circulated rapidly and widely [PE2-DP3]. Hashtag-linked conversations on #MrBatesvsPostOffice quickly connected with the longer-running #PostOfficeScandal thread [PE3-DP4], prompting broadened public awareness and collective public endeavours of surfacing earlier news coverage, archival sources, and ongoing investigations. Journalists such as Nick Wallis (@nickwallis) and Karl Flinders (@Karlfl) were actively tagged, followed, and retweeted, amplifying their posts and live updates [PE4-DP5-IJ10] [10, 11].

By tracing the digital archival and engaging in activities on Twitter [PE5-DP6-IJ10-TM11], the public also intensified the momentum by calling for accountability through public tagging and hashtag campaigns. Users tagged public officials, Post Office executives, and institutions believed to be responsible, urging public inquiry, compensation, and policy change. For instance, hashtags such as #JusticeForPostmasters, #Vennells (former Post Office CEO), and #Fujitsu (Horizon vendor), became rallying points, enabling the public who were loosely connected to collectively join a collective discourse, interweaving with media practices to advocate for resolutions. This knotting of public engagement, journalistic and media practices, alongside digital platforms, coalesced into a shared sense of outrage and purpose, reinforcing a collective identity as activists among distributed publics, media professionals, and victims.

Meanwhile, the comment sections on journalism blogs saw renewed activity. Viewers of the drama

[10] Thomson, R. (2009, May 11). Bankruptcy, prosecution and disrupted livelihoods - Postmasters tell their story. *Computer Weekly.* https://www.computerweekly.com/news/2240089230/Bankruptcy-prosecution-and-disrupted-livelihoods-Postmasters-tell-their-story

[11] UK Magazine disputes Chinook tragedy cause. (1999, May 26). *BBC News.* http://news.bbc.co.uk/2/hi/uk_news/353063.stm

sought out these sites for verification, extended reading, and continued discussion. Posts expressing gratitude for long-term coverage sat alongside fresh demands for justice and accountability [PE6-DP7-IJ11]. Readers frequently traced their journeys back to the story, many noting that they had heard fragments over the years but only grasped the full picture after the ITV broadcast [PE7-DP8-IJ12-TM12]. This recursive engagement and interweaving reactivated earlier flows of media and created new knots of shared attention.

Together, these interweaving action lines through emotional reaction, real-time advocacy, direct engagement with media professionals, and participatory content production constituted a thickened, complicated, yet coherent knotting process, which we conceptualize as **compound knotting**. Unlike the earlier momentum that quickly dissipated, this compound knotting process gained strength and continuity through layered reactivation and amplification across media forms. The digital infrastructure not only supported the drama's impact but amplified, distributed, and extended it, allowing for continued participation, rediscovery, and the activation of new publics. In doing so, it created a durable and evolving meshwork where lines of action within the converging media system continued to loop back, correspond, and grow.

4.6 Discussion

Our analysis adopted the Ingoldian perspective (Baygi et al., 2021; Ingold, 2015) to examine how the converging media system, reconfigured through digital transformation, was shaping the momentum and evolution of social activism in response to one of Britain's most serious miscarriages of justice - the Post Office Horizon Scandal. Our analysis revealed two distinct yet interconnected knotting processes through which media flows came together to generate momentum for activism – *Concentrated Knotting* and *Compound Knotting***.** These two knotting processes represent distinctive forms of correspondence (Ingold 2021b) and offer a novel

perspective for understanding how media convergence and digital transformation reshape the possibilities for activism and collective identity. Our findings demonstrated that the knotting forms do not emerge uniformly but is shaped by the transforming media system. The shift toward algorithmically mediated circulation amplified participatory engagement to create new conditions under which action lines become entangled. The key constructs that emerged from our findings are presented in Table 6.

4.6.1 Transition of Activism in a Transforming Media System

The first opportune moment (Ingold, 2021a) was formed through concentrated knotting of lines driven by traditional media outlets and investigative journalists, which created a sudden but short-lived surge of visibility of the scandal. It emerged at an early stage of media convergence, when social media and other digital platforms started to integrate into the media system (see [DP1-IJ4-VI3]). This echoes early research on digital activism, stressing that social movements often originate not from coordinated campaigns but from informal, loosely connected actions and opportunistic encounters (Garrett 2006; Pickerill 2003). However, digital platforms had not matured into living infrastructures to hold strands together to sustain and grow participatory efforts. Thus, the knotting of action lines of journalism, victims, and limited digital traces created a dense but soon loosened node of correspondence, with attention scattered and strands diverging, which led to the fade of the momentum.

This early knotting process is also marked by the emergence of **micro-solidarity clusters** is observed, which refers to the small, tightly connected individuals (i.e., investigative journalists and victims) that share mutual understanding and purpose (Gerbaudo and Treré 2015) to expose injustice. The knotting process of these clusters played a crucial role in catalyzing early, yet localized visibility. Meanwhile, **latent media traces** are produced but remain inactivated, through

which under-circulated media deposits, such as isolated testimonies, local reports, and blogs, were preserved, yet remain inactivated in collective memory or discourse (Treré 2018).

Dimension	Concentrated Knotting	Compound Knotting
Action Lines	• Investigative Journalists • Traditional Media Outlets • Victims • Emergent Digital Platforms (e.g., YouTube, Blogs, Websites)	• Investigative Journalists • Traditional Media Outlet • Victims • Mature Digital Platforms (Distributed & algorithm-driven media platforms) • Public Engagement
Activist Momentum	Rapid journalistic investigation and reporting; sudden momentum with little follow-through or activation of broader networks	Ongoing, active, recursive tracing by both publics and journalists; sustained engagement enabled by digital platforms and broadcast events
Knotting Form	A *sparse* weave swells into a *dense* knot, with *momentary convergence & tension*, before t*apering off into a light, open* weave with few persistent strands	A *sustained, recursive* interweaving; earlier strands are re-engaged and thickened; *knots grow in density and cohesion*, becoming durable nodes of continuity and transformation
Collective Identity	Micro-solidarity clusters	Distributed activist identity
Communicative Channel	Latent media traces	Live social mobilization media

Table 6. Transition from Concentrated to Compound Knotting

In contrast, the second opportune moment through compound knotting arose within a highly converging and digitalized media system. The knotting process emerged through recursive and layered interweaving of multiple action lines involving digital platforms, public participatory practices, persistent investigative journalism, traditional media reporting, and broadcasting (e.g., [PE5-DP6-IJ10-TM11]). While existing studies focus on investigating viral spikes or rapid mobilization, our findings echo studies on activism that stress the importance of sustaining affective and informational ties over time. (Treré 2018). In our case, as the dynamic digital infrastructure maturing, social media threads, journalistic blogs, and news sites have become living archives, through which ongoing correspondences among new and old action lines continuously

loop back to public discourse around the scandal. That is, the continuity of investigative coverage created a slow but steady rhythm that allowed the public to join the knotting process at different points. These recursive and layered knotting form and interweave into a meshwork (Ingold 2016a; Ingold 2021a), which is an open-ended, evolving knotting process that preserves shared memory and sustains future collective mobilization. This illustrates how digital transformation of the media systems sustains activism, not only through storing content but by enabling its recirculation and ongoing correspondence, highlighting the importance of continuity, not intensity alone, in sustaining momentum for the pursuit of activism.

Moreover, the compound knotting process gave rise to a more **distributed activist identity**, which is constructed beyond investigative journalists or victims, but through overlapping, ongoing engagements among media professionals, publics, and digital platforms. This echoes existing literature discussing how the digitalization or converging media system reshapes the collective identity of loosely connected individuals via digital means (Milan 2015). The ongoing knotting of multiple action lines within the digitalizing media system through hashtagging, commenting, sharing, and swift live reporting allows the shared identity to evolve dynamically (Jackson 2016; Papacharissi 2016). It also gives rise to **live social mobilization media**, which is defined as communicative channels that are digitally enhanced for real-time, interactive communication and mobilization. In our case, Twitter threads and interactive blogs were particularly powerful to enable real-time and affective-led interplay for activism to unfold (Tufekci 2017).

This transition from concentrated to compound knotting reflects the broader and deepened convergence within the media system (Dwyer 2010; Jenkins and Ito 2015), which is an ongoing interweaving of technological, cultural, and industrial changes that dissolve the boundaries between audiences and professional media practices. While traditional media outlets and

professionals used to dominate authority and power in shaping public discourse (Reese 2020), our findings suggest that momentum generated through such exposure of injustice, even when related to large-scale institutional wrongdoing with several consequences, is rarely sustained by sole professional media coverage. Instead, enduring visibility and growing public engagement are knotted through continued correspondence, carried forward, reactivated, and amplified through the interweaving digital platforms, distributed publics, media professionals, and victimized individuals in the digitally transforming and converging media system. In the Horizon case, the televised drama was not an isolated event but produced through the correspondence of investigative journalists and traditional media organizations (see [IJ9-TM9]), which was further amplified through its knotting with the broader movements of victims, the public, and digital platforms. This reflects how the increasingly converging media system enables both traditional and digital media forms to co-evolve (Chadwick 2011), recombine, and synchronize dispersed public attention and engagement into an ongoing meshwork of collective interweaving movements.

In sum, the two knotting patterns also highlight how digital transformation of the media system is reshaping the *communicative channels* and the *formation of collective identity* within activist mobilization, which are the central tenets of activism (Chon and Park 2020). While concentrated knotting foregrounds how early momentum relies on tight-knit micro-solidarity clusters in an emergent converging media system, compounded knotting reveals a highly digitalized media system, where professional media practices, organizations, publics, and the activist identities are ongoingly reconfigured through continuous correspondences. Our study demonstrates that the momentum of activism in digitally converging media systems is no longer contingent upon traditional journalistic authority (Reese 2020), but increasingly shaped by how different media action lines are knotted, sustained, and reactivated.

4.7 Theoretical Contributions

The study makes three theoretical contributions foregrounding the intersection of digital-enabled media convergence and social media activism through a Ingoldian understanding of how evolving media systems shape professional media dynamics and activist momentum.

First, this study contributes to the literature of DT by theorizing how DT unfolds within a media system, extending the predominantly firm-centric conceptualization of DT (e.g., Wessel et al. 2021; Baiyere et al. 2020). Where existing DT research focuses largely on bounded organizational or industry settings, this study demonstrates that evolving media systems that are ongoingly transforming (Chadwick 2017) digitally alters not only the technological architecture within a changing terrain but also the temporal, relational, and affective conditions under which public meaning-making and collective actions emerge. Rather than being structured, goal-oriented change (e.g., Verhoef et al. 2021; Singh and Hess 2017) in other industries, the DT of a complex media system constituted of multiple moving action lines is conceptualized as an emergent process that foregrounds how temporal rhythms, algorithmic surfacing, and distributed participation in a converging system configure when and how societal issues gain visibility. This reconceptualization extends DT literature by demonstrating that DT can be relational, temporal, and ongoing, rather than staged managerial interventions.

Second, this study contributes to advancing the theorization of media convergence by reconceptualizing the media system not as a static integration or network of professional media practices, social participation, and technologies (Chadwick 2017; Reese 2020) but as a living meshwork of flowing and knotting action lines (Ingold 2015), revealing a dynamic and ongoing socio-technical phenomenon. Through the identification of concentrated and compound knotting, we show how distinct forms of media convergence produce different temporal rhythms (Baygi et

al. 2021) of visibility, memory, and mobilization. Further, it reveals how activist momentum is shaped not only by journalistic reporting or digital-enabled participation from the public but by a recursive and layered interweaving of journalistic, technological, and public engagement, responding to unfolding societal currents (Ingold 2015; Jenkins 2006). This challenges the static phase-based views of media evolution (e.g., McPhillips and Merlo 2008; Peil and Sparviero 2017), and contributes to a dynamic, processual understanding of how continuity and intensity (Papacharissi 2016; Treré 2018) co-evolve and sustain activist trajectories in a digitally transforming media system.

Finally, this study contributes to the literature on social media activism by introducing knotting (Ingold 2015; Ingold 2021b) as a conceptual process through which collective identities and communicative channels that are critical to activism (Chon and Park 2020) emerge. Our study illustrates how activist identity evolves as part of the digitally transforming media system, from micro-solidarity clusters that are rooted in tightly knit relational groups to a distributed activist identity that is expansive and sustainable for the shared interweaving towards social justice. In this way, we enrich the existing literature on connective actions in the digital era (Bennett and Segerberg 2012) by embedding digital activism within a knotting, evolving media system where collective mobilizations are not bounded by the coordination of a single platform or event (e.g., Tufekci 2017), but are formed and activated through layered and recursive strands and correspondence within the continuously converging media system. Our lens invites the rethinking of activism not as conventionally reactionary or episodic movements (Della Porta and Kriesi 1999; Poell 2020), but as a steady knotting of narrative into enduring movements for social justice.

4.8 Conclusion and Practical Implications

Through an in-depth case study of the UK Post Office Horizon IT scandal, this study explored how the digital transformation of the media system that is ongoingly converging shapes the momentum and form of social activism. By adopting the Ingoldian perspective, we traced how diverse action lines of professional journalism and media practices, victimized individuals, digital platforms, and the public, interwove momentarily or recursively to generate and sustain the momentum for activism. By identifying two distinct knotting processes (i.e., concentrated and compound), our study captured how activism trajectories unfold not through bounded media interventions but through layered and temporally situated correspondences. Our findings illuminate how activism in the digital era is sustained not by isolated spikes of attention but through thickening, ongoing layering, and the timely amplification of the knotting process within the converged media current. By conceptualizing the media system as a living, adaptive meshwork rather than a static integration or network, and by emphasizing the temporal and relational constitution of activism, our study offers a flow-oriented understanding of how societal justice is pursued in digitally mediated environments.

Beyond the theoretical contributions, this study also has several practical implications. For media professionals, particularly journalists, our study underscores the importance of continuity and collaboration in building lasting momentum. That is, activist impact is not only achieved through major spikes but also through the persistent weaving of narratives and attuned engagement with the public across time and platforms. Thus, it is important for media professionals to engage in relational dynamics of story-building and collaborations in investigative reporting. While prior studies have highlighted that social media platforms are challenging the role of journalism, the ability of digital platforms to guide social participation and accelerate information synchronization

remains crucial. These capabilities should be strategically harnessed to maximize their potential for positive societal impact.

Second, for activists who are in the process of pursuing social justice, our study reveals that effective mobilization increasingly depends on the alignment and collaboration between the public, media professionals, and digital technologies. Thus, constructing a distributed collective identity is important for activism to thrive, not only through episodic events, but through collective memory and sustained dialogue embedded in the media infrastructures. Activists should recognize and foster the recursive media flows that can help translate momentary visibility into momentum for collective mobilizations and social justice.

Chapter 5: Discussion & Conclusion

5.1 Introduction

Overall, this thesis set out to investigate how digital transformation (DT) unfolds across diverse contextual settings, and what mechanisms, structures, and dynamics shape the development of DT under varying structural conditions. While receiving increasing scholarly attention in IS, the existing literature on DT remains focused on firm-centric and resource-rich contexts, leaving a limited understanding of how DT emerges and evolves under complex, constrained, or fluid conditions. To address this gap, this thesis took a multi-study, qualitative inquiry across three distinct empirical settings (i.e., supply networks, not-for-profit organizations, and digitalizing media systems). This final chapter serves as the conclusion of this thesis, synthesizing insights across the three studies and articulating the overarching theoretical contribution to position the unique stance of this thesis in DT research. Subsequently, the overall practical implications derived from the studies will be outlined, alongside the limitations and directions for future research.

5.2 Cross-study Analysis

This section systematically brings together the core theoretical and empirical findings from each study, illustrating how DT is fundamentally shaped by and manifests differently across distinct organizational and institutional contexts. Table 7 provides a comprehensive overview of the key theoretical concepts introduced and how they address the specific research gap identified within the respective chapters.

The three studies revealed how DT is deeply contingent on the contextual conditions. In Study 1, DT unfolds within a supply network characterized by complex inter-organizational dependencies (Tang et al. 2016) and power dynamics (Pierce 2009), where an influential core firm must lead

(Maestrini et al. 2017; Mokhtar et al. 2019b) to coordinate the transformation across multi-tiered and heterogeneous network participants (Hearnshaw and Wilson 2013) . Study 2 focuses on the not-for-profit context, where persistent resource constraints (Malatesta and Smith 2014) and heightened accountability (Hull and Lio 2006) present distinct challenges and opportunities (Holmes and Moir 2007; McDonald 2007) for DT. Study 3 explores the media system as a digitally converging and fluid meshwork (Baygi et al. 2021), where no single actor plans or controls the transformation process. Instead, momentum within the digitally converging media system needed to generate societal impact is co-shaped by the ongoing interweaving of journalistic, technological, and public forces. Together, these empirical settings highlight how structural conditions, such as network interdependencies, resource constraints and access, and dynamic infrastructure, critically shape the form, pace, and direction of DT.

Across these diverse contexts, this thesis identifies distinct yet comparable mechanisms through which DT is effectively enacted. Study 1 theorizes exercising inter-organizational DT leadership as a process comprised of four mechanisms: strategizing, exemplifying, rallying, and assembling. These mechanisms reflect how a core firm gains credibility and influence to mobilize change beyond its boundaries. Study 2 develops the concept of *resource fluidity* to explain how NFP organizations identify and mobilize polymorphic resources through the phases of identification, activation, and application, without requiring ownership. Study 3 adopts a flow-oriented lens and introduces the concepts of *concentrated knotting* and *compound knotting*, illustrating how activist momentum forms through the recursive interweaving of media action lines. Across all three studies, DT is shown not as a uniform trajectory, but as a contextually contingent and temporally unfolding process enabled by situated mechanisms.

	Study 1 (Chapter 2)	Study 2 (Chapter 3)	Study 3 (Chapter 4)
Overarching RQ	***How does DT unfold across diverse contextual settings, and what mechanisms, structures, and dynamics shape the development of DT under varying structural conditions****?*		
DT Context	Supply Networks Core Firm Perspective	Not-for-Profit (NFP) Organizations Crisis Response	Converging Media System Social Activism
RQ	*How can a core firm effectively develop and enact inter-organizational leadership for successful SNDT?*	*How doNFPs identify and mobilize the resources required for DT without ownership?*	*How do evolving action lines within a digitally transforming media system and their correspondences shape momentum for social activism?*
Level of Impact	Inter-organizational level	Organizational level	Institutional level
Key Findings	Effective SNDT involves four mechanisms (i.e., strategizing, exemplifying, rallying, and assembling) that progressively build core firm's inter-organizational leadership credibility and mobilize network-wide DT efforts	For NFP organizations, resource fluidity is a critical state achieved through a three-phase process (i.e., identification, activation, and application), enabling DT through transient, access-based resource configurations	DT of media system ongoingly shape momentum for activism in a dynamic, temporally conditioned process of knotting; two distinct forms were revealed: concentrated knotting (rapid, short-lived surges) and compound knotting (sustained, layered, and recursive interweaving)
Contextual Insights	DT extends beyond firm boundaries, requiring a hybrid form of inter-organizational leadership adapted to network interdependencies	DT in resource-scarce, high-accountability contexts can be loose in strategic planning, and demands flexible, access-based resource mobilization & mission-driven governance	DT at societal level is an emergent, continuous becoming, where collective actions are shaped by the interplay of evolving media lines
Ontological View	Entity orientation	Entity orientation	Flow orientation
How DT Unfolds (Process/Nature)	DT as a structured process, characterized by discernible phases, shaped by contextually embedded entities and their interactions.	DT as a structured process, characterized by discernible phases, shaped by contextually embedded entities and their interactions.	DT as a temporal becoming, ongoingly shaped by continuous lines in motion, without predefined trajectories or fixed goals.
Temporality	Clock Time	Clock Time	Kairotic Timing
Ontological Insight	• DT as a series of intentional decisions, actions, and adjustments by organizational stakeholders to achieve specific DT objectives and outcomes. • Provides insights into the structured mechanisms of building and exercising inter-organizational DT leadership	• DT unfolds through strategic resource identification, activation, and application, enabling transformation even without traditional resource ownership • Challenges for-profit rooted assumptions by focusing on access-based and relational resource arrangements	• DT as an emergent, unfolding process of becoming • Changes emerge through continuous, interweaving lines and dynamic correspondences (e.g., concentrated and compound knotting in activism)

Table 7: Cross-Study Analysis – Contextual and Ontological Comparison

5.3 Theoretical Integration & Contribution

This thesis makes several contributions that go beyond those of the individual studies. In this section, I will articulate the overarching theoretical advancements of this thesis to the broader DT literature and demonstrate how the collective findings address the thesis's central argument regarding context-sensitivity and ontological pluralism.

5.3.1 Reaffirming Context-Sensitivity as a Critical Lens for DT Research

Across the three studies, this thesis demonstrates that DT is not a universal or one-size-fits-all phenomenon. Rather, DT is profoundly contingent on the distinct contextual conditions within which it unfolds (see Table 7), echoing previous literature highlighting the importance of contextual conditions for DT (Hanelt et al. 2022). Specifically, these divergent empirical settings highlight that DT is always enacted within and contingent upon specific structural and temporal configurations. A context-sensitive lens is therefore essential for generating relevant and actionable theoretical explanations of complex socio-technical phenomena (Monteiro et al. 2022). As such, this thesis challenges the utility of generalized frameworks that risk oversimplifying (Davison and Martinsons 2016) the complexity, multiplicity, and situatedness of DT across organizational and societal domains.

Moreover, the empirical settings examined in this thesis, including supply networks, NFP organizations, and a converging media system, represent underexplored yet significant contexts (Venkatesh 2025) in DT research. By engaging with these domains, this thesis extends the reach and the relevance of DT theorization beyond the dominant firm-centric boundaries (e.g., Baiyere et al. 2025; Li et al. 2018). As a result, the complexity of DT beyond organizational boundaries remains relatively under-theorized. For instance, although supply chain DT has gained some attention in operational research (e.g., Hartley and Sawaya 2019), its inter-organizational dynamics

remain emergent topics in IS. However, the contexts explored by this thesis surface distinctive challenges - such as navigating network interdependence, heterogeneity in SN digital capabilities; operating under resource scarcity, transient resource access, heightened accountability, rather than topdown planning; or shaping public discourse through dispersed and layered media flows ongoingly - that are often overlooked in mainstream DT literature. At the same time, they reveal alternative pathways for DT in constrained or less-structured settings. This expansion of empirical focus not only enhances the theoretical diversity (Monteiro et al. 2022) but also contributes to a more inclusive understanding of how DT manifests across sectors and scales.

5.3.2 Ontological Pluralism in Complex Socio-technical Phenomena

This thesis strategically adopted ontological pluralism to explore the multi-faceted nature of DT. Specifically, Studies 1 & 2 (Chapters 2 & 3) adopted an entity-oriented view (see Baygi et al. 2021), conceptualizing DT as a structured and phased process, involving intentional organizational actions, such as leadership development and resource mobilization. This aligns with previous literature that conceptualizes DT as an outcome-oriented, phased process driven by managerial intent and bounded organizational decisions (e.g., Kane et al. 2017; Verhoef et al. 2021). Meanwhile, a growing body of literature has acknowledged the unplanned or unintended consequences of DT (e.g., Deng et al. 2016; Senyo et al. 2024). However, these accounts often view the outcomes as outcomes that diverge from a predefined DT trajectory, rather than as inherent to the unfolding nature of the transformation itself.

Furthermore, Study 2 provides nuanced insights into this discussion by illustrating how DT can emerge in resource-constrained environments not through long-term strategic planning, but in response to urgent external triggers, such as the disruptions caused by the COVID-19 pandemic. While adopting the entity-oriented perspective, the study demonstrates how NFP organizations

mobilize DT resources through transient and flexible arrangements, adapting in real time to evolving challenges. The theoretical model of resource fluidity foregrounds how DT is often improvised, shaped by flexible redeployment, experimentation, and contextual judgment under pressure. As such, Study 2 enables the problematization of the dichotomy between planned and emergent DT, demonstrating that even structured processes can be rooted in reactive, situational dynamics.

Study 3 (Chapter 4) deepens this contribution by employing a flow-oriented perspective, drawing on Ingold's (2013, 2015) conceptualization of lines and knotting, to examine DT as a process of emergent becoming. This perspective reveals how momentum for societal change is cultivated not through planned intervention, but situated, temporal correspondences among ongoing, recursive interweaving of lines within the media system. In doing so, it moves beyond viewing the emergence of unplanned consequences as an aftereffect, but as constitutive of the DT process itself. Together, Studies 2 & 3 reveal how DT is not always a result of coherent pre-planning, but of situated adjustments and relational movements within specific organizational and societal settings. By holding the entity and flow-oriented perspectives in productive tension, this thesis offers a more comprehensive ontological account of DT to capture both its structured, planful dimensions and its dynamic, relational unfolding. Adopting such pluralism allows this thesis to reveal a richer understanding of DT as not only managerial initiatives, but also as a lived, socio-technical phenomenon, shaped by crisis, contingency, temporality, and processual movement.

5.3.3 Beyond Traditional DT Leadership & Resource Mobilization

This thesis also contributes to expanding the existing scholarly discussions on DT leadership and resource mobilization by introducing the concepts of *inter-organizational DT leadership* and *resource fluidity*. These contributions challenge the predominant firm-centric (e.g., Firk et al. 2021;

Tumbas and Berente 2018) and ownership-driven assumption (e.g., Baiyere et al. 2025; Gilch and Sieweke 2021) in the DT literature that often emphasizes individual-level leadership, internal capabilities, and proprietary control as prerequisites for DT (Vial 2019). In Study 1, DT leadership is shown to transcend organizational boundaries, possessed by organizational entities rather than individuals, and requires hybrid forms of influence that blend the transactional mechanisms (e.g., mandated alignment and monitoring) with transformational elements (e.g., visioning, coaching) to coordinate complex supply network (Defee et al. 2010; Mokhtar et al. 2019a) digital transformation. It revealed how core firms must strategically align, support, and assemble their network partners to enact SNDT, moving beyond unilateral control towards distributed mobilization and improvisation.

In addition, Study 2 reconceptualizes resource mobilization by demonstrating how NFP organizations navigate DT and achieve successful DT outcomes not through the accumulation of proprietary assets, but by identifying and flexibly deploying polymorphic resources. These resources are not owned or permanently held by the organization, but are accessed through community relationships. These findings challenge the existing knowledge on strategic resources, which must be internally owned and stably configured (Piccoli et al. 2024). These insights foreground the distributed and embedded nature of DT, especially in resource-constrained settings, where resource mobilization for DT involves creatively leveraging external ties based on mutual missions (McDonald 2007). Collectively, these findings offer a conceptual reorientation to reflect the multi-faceted phenomenon of DT in interdependent and resource-diverse contexts.

Taking together, these constructs demonstrate that DT is not a uniform organizational process but a contextually situation, pluralistic phenomenon that could emerge from network-level coordination, access-based and relational resource arrangement, and the co-movement of media

flows. Therefore, this thesis advances the DT scholarship by showing that different empirical settings require different explanatory constructs, and that DT unfolds through mechanisms contingent to structural conditions, resource configuration, and levels of analysis.

5.3.4 The Emergent & Processual Nature of DT

Finally, this thesis offers a theoretical lens to understand DT at a broader societal level, which echoes the existing call on positioning DT as a societal-level phenomenon (Hinings et al. 2018; Seidel et al. 2025). Specifically, Study 3 theorizes how DT within the media system gave rise to different forms of momentum for activist mobilization as the process of *knotting*. Grounded in Ingold's (2013, 2015) notion of knotting and the flow-oriented perspective (Baygi et al. 2021), this conceptualization captures how activism momentum emerges through ongoing, recursive interweaving of journalistic, technological, and public action lines. Instead of being coordinated by discrete actors or entities, the activist movements are formed from situated, temporal correspondences across lines within the digitally converging media system (Chadwick 2017; Jenkins and Ito 2015). This processual view challenges the static or episodic accounts of societal change (Della Porta and Kriesi 1999; Poell 2020) and foregrounds the ongoing nature of DT in shaping collective identity and social reality (Papacharissi 2016). By tracing these flowing lines, this study contributes to the emerging literature that acknowledges DT not merely as an organizational-level phenomenon but as a socio-technical transformation with far-reaching societal implications (Vial 2019).

5.4 Practical Implications

The integrated theoretical insights across the three studies provide several important practical implications for diverse stakeholders engaged in DT. Specifically, practitioners and policymakers can adapt the context-sensitive strategies to their respective domains and settings, translating the

theoretical contributions into actionable prescriptions to support more inclusive and sustainable DT efforts.

First, for business leaders and core firms of their networks, the findings underscore the need for a collaborative and outward-looking DT strategy. In particular, in contexts of high interdependencies like supply networks, firms should move beyond internal optimization toward active mobilization of interdependent external partners. Core firms should wield their influence by adopting inter-organizational leadership practices, with a combination of strategic visioning, role modelling, and capacity support to mobilize network-wide DT. Showcasing internal DT success stories via pilot implementations, measurable impact, and transparent communication can generate credibility and trust to encourage network partners' buy-in. Incentivizing engagement and providing tailored support across the network are also essential for fostering participation by peripheral entities for network-wide DT.

Second, this thesis offers prescriptive guidance for NFP organizations and their stakeholders, such as donors and sponsors, that face a distinct set of challenges in navigating DT, particularly due to limited access to proprietary resources and heightened accountability. The concept of resource fluidity sheds light on how NFPs should focus on identifying polymorphic resources that can be flexibly redeployed across ministries and functions, and cultivating an internal vision that supports experimentation and redeployment capabilities. This approach allows NFP organizations to innovate cost-effectively without the burden of long-term asset ownership. In addition, mission-driven governance emerges as a critical balancing mechanism to ensure that DT initiatives remain aligned with societal values that guide NFP organizations, which are critical for NFP organizations to retain trustworthiness and legitimacy among external stakeholders (Chen et al. 2020). External supporters of NFP organizations, such as sponsors and donors, should recognize the strategic value

of access-based resource mobilization and support NFP organizations in developing relational access to ensure sustainable DT.

Third, for social activists, media professionals, and policymakers, this thesis provides valuable insights into the evolving and interweaving nature of digitalizing media systems as terrains for civic engagement and fostering social change. The conceptualization of *knotting activism* highlights the importance of harnessing the dynamic nature of media action lines to build and sustain activist momentum over time. Activists and journalists can engage in layered and diverse forms of correspondence, such as investigative reporting, participatory storytelling, and social media campaigns, to build recursive visibility and emotional resonance for collective memory and discourses (Treré 2018). Policymakers and platform providers could gain insights into the critical role of shaping conditions for such correspondence in the media system. In other words, they should prioritize the development of inclusive, transparent, and participatory digital infrastructures that support constructive public discourse and amplify marginalized voices. Doing so can ensure that the digitally transforming media system remains a vibrant and democratic terrain for collective movements and social justice.

Across the three cases, effective DT requires context sensitive, relational, and adaptive forms of coordination, regardless of whether the setting is inter-organizational, organizational, or at the societal level. Although the mechanisms differ across contexts, the overarching implications across cases demonstrate three important implications for practitioners and policymakers. First, it is important to mobilize distributed agents rather than relying solely on internal transformation efforts. Whether coordinating SN efforts, volunteers, or dispersed media agents, transparency, credibility, and relational engagement must be cultivated. Second, DT often advances through flexible and access-based resource arrangements, not only through owned asset. SNs benefit when

core firms reduce the cost and coordination burdens for other participants; NFPs progress by identifying polymorphic resources that can be accesses and redeployed across initiatives; and social activists leverage diverse digital tools via relational networks and platform-based infrastructures. Finally, practitioners must learn to navigate and leverage digital infrastructures that shape visibility, interaction, and participation. While SNs rely on shared standards and interfaces, NFPs translate digital tools into mission-aligned practices, and activists correspond across multi-directional media flows to generate public momentum. What unites these contexts is the need to work with dynamic and sometimes unpredictable infrastructures that transform how information circulates, how coordination occurs, and how collective action unfolds. For policymakers, this underscores the responsibility to support inclusive and transparent digital infrastructures that enable constructive participation and amplification of marginalized voices.

Together, these practical implications reaffirm the central motivation and argument of this thesis. That is, DT is deeply embedded in its contextual settings (Hanelt et al. 2022), and must be approached as a situated, relational, and often collaborative endeavor. By tailoring DT strategies to the specific conditions of their contexts, diverse stakeholders can navigate the complexity of DT and realize its transformative potential in a more effective manner.

5.5 Limitations & Directions for Future Research

While offering novel theoretical insights into the contextual and ontological dynamics of DT, this thesis is not without limitations. These limitations do not detract from the value of the findings but rather define the scope of the claims held by the research inquiries of this thesis and point to opportunities for future research (Ioannidis 2007).

First, the interpretive and qualitative nature of my research inquiries prioritizes depth over breadth (Walsham 1995b). All three studies comprising this thesis employed an in-depth case research approach to generate rich, context-sensitive insights to advance the current theoretical understanding (Walsham 1995a). While this approach is well-suited to explore complex IS phenomena (Lee and Baskerville 2003), it does not aim for statistical generalizability. Therefore, the findings are not intended to be universally representative of all organizations undertaking DT but are instead designed to contribute to theory-building by illuminating underexplored mechanisms and relationships within specific settings (Venkatesh 2025). Consequently, future research could build on these insights by employing comparative case designs or mixed-methods approaches to validate, refine, or extend the theoretical frameworks and constructs in this thesis. This would help bridge the gap between rich contextual theorization and broader empirical validation, and enhance the generalizability and applicability (Mattke et al. 2022; Venkatesh et al. 2016) of the broader DT research.

Second, while this thesis spans multiple contexts to offer a broader understanding of DT, its boundary conditions are limited by our data collected, hence specific focal areas within each context. That is, this thesis focused on inter-organizational level leadership, resource mobilization, and activist momentum, providing deep insights into how DT unfolds in supply networks, NFP organizations, and digitally converging media systems. However, other salient dimensions of DT, such as organizational culture (Kane et al. 2015) and emerging issues in digital ethics (Vial 2019), remain outside of the scope of this thesis. As such, this thesis should be viewed as rich in theory but thematically selective in its contribution to the broader DT literature. While this thesis cannot account for all the possible ways in which DT may unfold across diverse contexts, the three conceptual innovations – inter-organizational DT literatures, resource fluidity, and knotting

activism – offer foundational starting points for future research. Although contextually grounded, many of the underlying mechanisms and dynamics identified here, such as hybrid leadership, access-based resource mobilization, and dynamic interweaving lines, are not strictly context-specific. Future studies could extend these frameworks by examining alternative temporal sequences, adaptations, or cross-context applications to enrich and diversify the DT theorization.

Finally, although engaging in the temporal-situated and processual nature of DT (Mozaffar and Candi 2024), the analysis of this thesis is based on snapshots within evolving trajectories of the (trans)formation. Each study captured situated processes over defined periods or stages, despite the open-ended, ongoing nature of DT (Vial 2019; Wessel et al. 2021). As such, while processual sensitivity was maintained through longitudinal data collection (Dawson 2019), the temporal depth remains bounded. Alongside previous literature that emphasizes DT unfolds across clock time through iterative cycles (e.g., Baiyere et al. 2020) and kairotic timing through optimizing the temporal quality of transitional moments (Mozaffar and Candi 2024), future research could adopt longer-term or multi-episode longitudinal designs (Langley et al. 2013)to examine how the mechanisms and processes in this thesis (e.g., inter-organizational DT leadership, resource fluidity, process of knotting) stabilize, adapt, or transform under changing socio-technical conditions. Such research inquiries would further illuminate the evolutionary dynamics of DT, offering deeper insight into its emergent and recursive qualities over time.

5.6 Concluding Remarks

To conclude, this thesis aims to explore the multi-faceted nature of DT across diverse contexts, arguing for a more nuanced, context-sensitive, and ontologically pluralistic approach to the scholarly discourse on DT. Responding to the ongoing calls for context-sensitive theorization in IS (Davison and Martinsons 2016; Monteiro et al. 2022; Venkatesh 2025), this thesis examines

how DT unfolds through distinct mechanisms or processes across supply networks, not-for-profit organizations, and digitally converging media systems. Through the three in-depth qualitative inquiries, this thesis has generated novel theoretical insights into inter-organizational DT leadership, resource fluidity, and the process of knotting. These conceptualizations illuminate how DT is shaped not only by technologies, but also by governance structures, resource arrangements, and evolving interweaving among stakeholders' actions. Collectively, these studies challenge the dominant, organizational-centric assumptions in the DT literature (e.g., Verhoef et al. 2021) by demonstrating how DT is enacted through situated practices, relational dynamics, and context-contingent strategies.

By acknowledging the complexity and attending to both the structured and emergent dimensions of DT, this thesis contributes to a richer and more comprehensive understanding of how entities, such as firms, networks, and institutional systems, transform in the digital age. It echoes the existing literature by underscoring that successful DT is not a one-off, linear, or universally applicable blueprint (Vial 2019; Wessel et al. 2021). Rather, it is a fluid, contingent, and recursive process that is embedded in contextualized norms (Hinings et al. 2018), material properties (Kallinikos et al. 2013), and social relations (Lanamäki et al. 2020). As such, this thesis highlights DT as a complex socio-technical process with diverse manifestations and consequences that cannot be reduced to technological implementation or managerial decision-making alone.

Moreover, this thesis advances the methodological agenda for DT research by illustrating the value of interpretive, grounded inquiry in uncovering the nuanced processes and perspectives that shape and are being shaped by the transformation across time and space (Strong et al. 2014; Walsham 1995a). By putting an entity-oriented view of structured change and a flow-oriented view that foregrounds temporality and emergence (see Baygi et al. 2021) in productive tension, this paper

adopts the ontological pluralism that opens new theoretical possibilities for understanding DT not as a set of actions and outcomes, but as an unfolding, co-constructed process of becoming.

In sum, this thesis serves as both a contribution and a call for advancing the body of knowledge on DT. It calls for scholarly attention to broaden the empirical and conceptual scope of DT research by engaging with underexplored yet significant settings to build in-depth, contextualized, theoretical explanations (Venkatesh 2025). It further emphasizes the importance of attending to the ontological and temporal dimensions of DT, recognizing it as an ongoing, situated, and multifaceted process. In doing so, this thesis contributes to a more inclusive, empirically grounded, and theoretically impactful understanding of DT and its comprehensive implications.

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Appendix A: Supplementary Information for Study 1

Table 8: List of Informants for Study 1		
Code	**Title**	**Themes Discussed**
Top Management		
M1	Chief Digital Officer (CDO)	DT development blueprint; lessons learned from DT journey; future plans to platformise the business; nature of partnership with business partners; market leadership & supply network leadership of Topsun; leadership styles
M2	Chief Operating Officer (COO)	Organisational background; development of Topsun's Business and the Influence of DT; the nature, challenges and history of DT at Topsun; Topsun's DT strategy; internal implementation of DT initiatives; corporate culture and relationship between organizational stakeholders
M3	Chief Information Officer (CIO)	Internal DT Infrastructure, capabilities; outsourced DT capabilities as a vendor; motivation of engaging in external DT; DT vision shift; the impact of DT on business model; the impact of client feedback on internal DT initiatives
Business Units		
B1	Senior Engineer	Smart production standards and procedures; lean management procedures; importance and impact system and data integration from internal and external sources; relationship with the DT team; impact of top management's leadership styles on DT
B2	Procurement Manager	Introduction to BU; BU-specific DT initiative & motivation for DT; relationship with the DT team; BU processes before & after DT; challenges of DT implementation; involvement in DT implementation; role of DT & IT teams in supporting BU operations
B3	Production Director	Relationship with top management; view of DT initiatives; involvement in DT implementations; establishment of production standards; use standards to manage business partners; internal efficiency improvements from DT implementation; conflicts/challenges in production standardization; interactions between BU and the DT team
B4	R&D Manager	Topsun's Industrial Internet platform's role in process standardization; top management leadership style; customization of software; values & benefits of Topsun's DT products for business partners; motivation for pursuing supply-chain transformation; supply-chain leadership; key considerations in meeting user requirements
B5	Marketing & Sales Director	Organizational role & structure of the BU; role of IT & DT; BU performance regarding DT implementation; benefits of DT; operational challenges of the BU; IT use in BU decision-making

B6	Marketing Manger	DT impact on routine tasks and BU; understanding of the SNDT infrastructure and Topsun's role in building it; SN financing business based on Outsideasy; CRM evolvement
IT Department		
I1	Deputy Head of IT	Operational improvements from DT implementation; DT development blueprint; lessons learned from DT journey; future plans to platformize the business; ecosystem thinking; nature of partnership with business partners; business model innovation/process for DT planning
I2	Product Manager A	Role of IT; difference between in-house developed products & commercial products; evidence of process improvements; example of business partners adopting Topsun's in-house developed IT products; relationship with BUs; guiding principles on software development; influence of corporate values on DT product development; role of CDO in the growth of the IT department; success factors of Topsun's industrial Internet product
I3	Product Manager B	Role of IT; difference between in-house developed products & commercial products; evidence of process improvements; example of business partners adopting Topsun's in-house developed IT products; relationship with BUs; guiding principles on software development; influence of corporate values on DT product development; role of CDO in the growth of the IT department; success factors of Topsun's industrial Internet product
I4	Manager of the Supplier Chain Operations Center	Inter-organizational system implementation; blueprint and scope of Topsun centric SNDT; realized benefits internal and SN-level DT initiatives; SN financing business based on Outsideasy; DT's impact on lean management and smart production
Business Partners		
P1	Supplier A - IS Manager	Relationship with Topsun; current stage of internal DT; motivation of implementing DT; business processes & performance efficiency before & after implementing DT; future plan for DT; role of Topsun in internal DT; motivation to collaborate with Topsun for DT; future collaboration with Topsun; difference between third party systems & Topsun developed systems
P2	Supplier A - Business Manager A	Understanding of internal DT initiatives; impact of DT on routine tasks; digital collaboration with Topsun and other SN partners; routine communication with Topsun for DT; Topsun's role in internal DT; Topsun's support in internal DT initiatives
P3	Supplier A - Business Manager B	Understanding of internal DT initiatives; impact of DT on routine tasks; digital collaboration with Topsun and other SN partners; routine communication with Topsun for DT; Topsun's role in internal DT; Topsun's support in internal DT initiatives
P4	Supplier B - Business Manager	Understanding of internal DT initiatives; impact of DT on routine tasks; digital collaboration with Topsun and other SN partners; routine communication with Topsun for DT; Topsun's role in internal DT; Topsun's support in internal DT initiatives

P5	Supplier B - CEO	Motivation of internal DT; existing DT initiatives; blueprint of internal DT; understanding of SNDT; engagement in SNDT; motivation of collaborating with Topsun for DT initiatives; Topsun's role in internal and SNDT
P6	Technology Collaborator (Deputy Head of Strategic Development)	Background & foundation of industrial Internet; ecosystem development approach on industrial Internet platform; ecosystem structure; supply-chain DT benefits for SMEs; reasons for working with Topsun; criteria for partner selection; benefits for ecosystem partners; training for partners

Table 9: Sample Interview Guide for Study 1

Thematic Interview Guide for Interview with the Chief Operating Officer of Topsun

Organisational Background

- Can you provide us with an introduction to Topsun?
- What are its main lines of business?
- Can you describe its current organizational structure?
- Who are its competitors?
- How is its current business performance relative to these competitors?

Development of Topsun's Business and the Influence of DT

- In one of your corporate presentation slides, there were three stages of growth described: (1) Steady Growth, (2) Rapid Growth, and (3) Explosive Growth. Why is the rate of growth at Topsun increasing over the years?
- How much of the growth is due to DT and the use of IT?
- Could you describe the manufacturing processes of your organization prior to DT?
- How have your manufacturing processes evolved as a result of DT?

The Nature, Challenges and History of DT at Topsun

- Can you describe the key phases of DT that Topsun has been through?
- What are some key challenges you faced during Topsun's DT journey?
- In one of your corporate presentation slides, you describe a number of lessons learnt over the informatisation journey of Topsun. Could you please explain each of those lessons learnt?
- What are the key IT initiatives that have been implemented as a result of DT?
- What business processes have you automated?
- How does DT and automation result in lean manufacturing?
- In Topsun's DT, have you adapted any principles of Industry 4.0? If yes, can you elaborate on it? If no, can you explain why?

Topsun's DT Strategy

- What is the overarching DT strategy within Topsun?
- How is the DT strategy aligned with its business strategy?
- How was this DT strategy developed?
- How is the DT strategy of Topsun unique compared to other organizations?

Internal Implementation of DT Initiatives

- How is the implementation of the various of IT systems initiated at Topsun?
- Are these implementations business-driven or technology-driven?
- How does the idea for a new IT system usually come about within the organization?
- What measures do you have in place to ensure the effective implementation of IT systems?

Corporate Culture and Relationship Between Organisational Stakeholders

- What is the corporate culture of Topsun?
- What are some of its management philosophies and core values?
- How would you describe the relationship of the top management with the business units?
- How would you describe the relationship of the top management with the IT department?
- How are key business decisions made at Topsun?
- How are key IT decisions made at Topsun?

Table 10: Interview Schedule

Date	Duration (mins)	Informant(s)	Type
20190121	110	M1, I1	Focus Group
20190121	124	M1, I1, M2	Focus Group
20190121	7	M1	Informal
20190121	57	M1, I1, B1	Focus Group
20190121	46	B2, B3, B4	Focus Group
20190122	33	M1, I1	Focus Group
20190122	86	I2, I3, I4	Focus Group
20190122	141	I1	Individual
20190122	35	I1, P1	Focus Group
20190122	15	M1	Informal
20190122	108	M1, I1	Focus Group
20190123	90	P6	Individual
20190123	55	B5	Individual
20190123	70	I4	Individual
20190123	53	M1	Individual
20200114	12	M1	Informal
20200114	119	I1, B2, I3	Focus Group
20200114	9	I4	Informal
20200114	141	M1, I1, B5, B6	Focus Group
20210607	230	M1, I1	Focus Group
20220712	90	P4, P5, P2	Focus Group
20230920	60	M3	Individual

20230921	202	I4, P1, P3	Focus Group
20230922	90	M3	Individual
20230928	40	I1, I4	Focus Group

Table 11: Corroborating Evidence of Study 1

First-Order Concept	Corroborating Interview Quote
Scaling Struggles in Operations	*"To produce at such a large scale without information technology for management…is impractical…When we reached a scale of around 250 million, relying on Excel was no longer possible…" – COO*
Navigating Economic Uncertainty	*After 2009, it became clear that it was no longer favorable to invest heavily in fixed assets, or build many factories... As a result, we adjusted our operational strategies and transitioned our supply chain strategies…gradually shifted to focusing primarily on outsourcing... our digitalization must rely on top-level design,… and integrate with our supply chain."– COO*
Strategic Role Evolution	*"Digital transformation fundamentally relies on IT talent. Their role has completely evolved from babysitters to stewards who engage meaningfully with the top management about the business model. Traditionally, IT personnel were fix-it folks for issues like unlit network cables…Our team…the primary focus is on software development, product management, and business model innovation." – CDO*
Strategic Alignment of DT Team	*"We need to take on the responsibility of aligning with the overall strategic direction of our company in a given year ... actively participate in the decision-making and implementation of the company's strategic initiatives. Strategic meetings are particularly interesting,… [with]a mention of the need for digitalization as a foundational infrastructure. In our daily interactions…We engage in conversations that go beyond the specialization of IT, encompassing the introduction and construction of entirely new business models. This includes optimizing and restructuring entire business processes, where we can provide more professional insights."– Deputy Head of IT*
Push for Lean Management & Standardization	*"If lean management isn't implemented effectively on the floor, there won't be a solid foundation for advancing information systems…Lean practices include standardization…including standardized procedures, workflows, and operational guidelines"– COO*
Efforts towards Integration	*""We integrated the PLM across different BUs, and with our supply chain CIM, then connected the MES,…to achieve real-time cost data for each production line…All costs must be broken down and assigned to individual lines…for products…the system should provide me with precise cost data for every single product by the time my product rolls off the line…Based on this vision, we are continuously integrating and refining modules to achieve seamless connectivity."– COO*
Strategic Vision for Lean Supply Chain	*"[It's] about 'lean supply chain,' which refers to a lean approach in the supply chain. In other words, if your lean approach is fragmented…you only manage your own segment of production and there is no coordination upstream, lean principles cannot be implemented." – CDO*
Connected Development of DT Vision	*"Through digital transformation, we hope to accomplish certain things within the industry. Specifically…, we aims to integrate industry, production, supply, and sales, establishing a fully connected supply chain…This approach ensures a sustainable development for our vision." – COO*
Strategic Objective-Centric Selection	*"One way to address this challenge is to convene immediate discussions with the top management to align plans with strategic goals…For skeptics,…, we prioritize working with those more open to change initially."– Deputy Head of IT*
Prioritising based on DT Readiness	*"We first need to choose departments with a relatively solid foundation (as pilot projects), including the quality of management, workers, and the stability of workers. So we prioritised based on these aspects at the beginning. The other thing is that there must be the desire to change, only then can we do it. If you had no desire to change, the resistance for the DT team would be high…so the core factor is people." – Production Director*

Table 11: Corroborating Evidence of Study 1	
First-Order Concept	**Corroborating Interview Quote**
Efficient Production Line Management with MES	*"Extracting data from production is crucial for use. Our MES integrates with the ERP system for real-time orders and production tasks. Using MES with on-site elements like hanging lines…and production line data, we effectively collect and track production data for real-time analysis…systems like hanging lines have been implemented in [multiple named internal factories]." – Product Manager A*
Need for Speedy Implementation	*"We could not do things the traditional way … with very standard and long process requirements. We have to be short and concise and adapt to constant iterations and keep up with its speed. Otherwise, we may miss out on the right timing by waiting for a perfect solution. By that time, the lag caused by production would also have come to pass." – Product Manager B*
Subtle Trial and Success	*"We believed in our DT initiatives, but skeptics remained… In such situations, we quietly implemented the initiatives elsewhere and achieved success. Then these successful outcomes became our benchmarks…the objections from other BUs were eliminated organically." – CDO*
Prioritising Cost-Efficient Solutions for Initial Acceptance	*"It is usual in factories that bad money drives out good money. That is, people do not want the good systems and equipment. In this case, we try our best to find… with emphasis on the costs, to find those that they are willing to try, and devote our efforts to help them with the implementation and improve the whole process so they are able to see the benefits. Then other factories see the outcomes and become willing to use them…So at the beginning people discussed our work but nobody wanted them, but once they are tried out, the rest would buy in because they see the efficiency"- Deputy Head of IT*
Translating Internal Experience to Shape Industry Standards	*"When working on industry-wide applications, we first consider our internal management needs. Then starting from here, with our accumulated experience from our internal projects and an understanding of the challenges faced by the industry, we are able to standardize our experience by creating standards, software systems, and platforms to help others standardize their processes according to their internal management needs."– Deputy Head of IT*
Recognition of Experience and Capability	*"…we have experience – at least it has been proven to be successful in-house. They [supply network partner] didn't just make a random decision to work with us. Their senior managers came to our company, and believed that our systems are good, and had faith in us before they let us do it. …Their IT team don't do development, nor do they have relevant experience... they primarily plays a maintenance role. But we have a R&D team [with many] software development engineers. I believe the key reason is our internal experience." – Product Manager A*
Selective Collaboration Based on Transaction Frequency	*"When discussing our collaborative platform with suppliers, our initial push was on the core suppliers due to our business integration. Our collaboration needs to be very frequent and intense, with deep cooperation. For one-time transaction suppliers, we don't set up such a requirement as it could be costly and challenging for them." – Product Manager B*
Core Partner-First Selection	*"In the earlier stages of defining and promoting relevant standards, we had to approach the core business partners first. Without close integration with these key businesses, or if they don't even do business with us, they wouldn't be interested in our advocacy." – Deputy Head of IT*
Prioritizing Essential Integration	*"Since there are too many SMEs…many often have a very low level of digitalization...what we focus on is the most essential aspect – managing inventory entry." – Deputy Head of IT*
Minimize Operational Disruption	*"It is essential that their actual practices can align with our system in such a way that the impact on their operations is minimized. Minimizing changes is critical because any modification comes with costs. For example, asking them to add a staff member for scanning introduces additional labor costs, which may eventually be passed on to us."– Product Manager B*
Transparent Information Exchange	*""Our interaction with suppliers is now in real-time online, facilitating order confirmation, acceptance, and delivery schedules updates…Such information becomes transparent to all parties involved … which significantly reduces information flow." – Procurement Manager*

Table 11: Corroborating Evidence of Study 1	
First-Order Concept	**Corroborating Interview Quote**
	""Another benefit is on delivery… It makes checking for discrepancies in monthly reconciliation easier compared to… the past hassle of searching for papers and asking others for help. Everything is now stored on the platform..." – Business Manager of Supplier B
Informed Decision Collaboration	*"Previously,…our procurement people might cancel it [an order] mid-production, then needed it again later… With the new system,… there would be a reminder to reconsider cancellations carefully…locking decisions internally… this improves accuracy and reduces waste, forcing our team to plan more cautiously." – Product Manager B*
Partner-Perceived Benefits of DT	*"Manual errors in packing and labeling… have decreased significantly…The inventory backlog has also been reduced significantly…from over 10,000 meters per month to 1-2,000 meters. a substantial decrease… It makes our cost control easier and reduces waste greatly…" – IS manager of Topsun's Supplier A* *"Receiving stock is much faster now. When without the barcode [RFID] on the items, we had to manually open each package to do the counting…now the truck simply passes the Dragon [scanner] gate…it could take several hours to process a truck of stock before. Now it only takes about ten minutes."— Business Manager of Topsun's Supplier B*
Supplier Awareness of Planning Consequences	*"For manufacturing firms, the core problem is planning, of which one of the most important elements is the matching and consistency of materials management. With the involvement of our network partners, it does not only benefit us in terms of inventory management but also benefits our suppliers… if we planned inconsistently, they will suffer the most… Then the problem would simply be them with overproduction and excessive warehouse management issues…They understand this." – Deputy Head of IT*
Supplier-driven DT Collaboration	*"With this system, it's much quicker and benefits everyone … most importantly, it saves significant costs. We know that Topsun has dragon gates installed [a scanner gate], she [the general manager] is also negotiating for one now…Our top management also found this [use of RFID systems] very helpful with our on-site management, and we are now working on setting relevant requirements for our clients." – IS manager of Topsun's Supplier A*
Proactive DT Vision of SN Partners	*"So far. We have been following their [Topsun's] footsteps…but we are also asking our suppliers to move in this direction with us…we are very willing to pass on all the good ideas and concepts Topsun shared with us, and see if it works so our cooperation could be more efficient."– CEO of Supplier B* *"We are also willing to take the lead and share our experience with our upstream and downstream partners…For example, there was a client recently asked about the systems we're using, the Dragon Gate…if they are effective, and how they work…We had a discussion with them."– Business Manager of Topsun's Supplier A*
Unleashing Market Influence	*"Because we are the largest order source. Initially, they may not grasp it, but cooperation is necessary… It's human nature to be reluctant to change… However, someone needs to push for change eventually. Our primary driver for pushing change is our transaction-based business model." – Deputy Head of IT*
Mandated Onboarding	*"All 225 suppliers that account for 90% of our procurement share have been successfully integrated into our Outsideasy platform. While some initially expressed resistance, they ultimately had to adapt, as non-compliance would result in losing orders from us." – Procurement Manager*
Leveraging Industry-specific Expertise	*"Topsun is not a tech company but a traditional manufacturer. However, the level of accuracy in what they've created, including all the aspects involved, is more advanced and refined than many typical tech companies… They've planned everything in a comprehensive and one-step manner based on our own needs and our operational scale…a fundamentally different starting point."."– CEO of Supplier B*
Adapting IT Solutions to Supplier Capacities	*""It [tailoring] depends on their management model…the level of IT integration…their level of dependence on us and demand…their IT capabilities may not be very advanced, or their equipment may not be as state-of-the-art…personnel quality issues...cost considerations… we tailor solutions based on the specific circumstances of each supplier. We provide simplified or reduced versions of the solutions. While the overall framework and process remain the same… supporting their initial management setup accordingly."– Manager of the Supplier Chain Operations Centre*

Table 11: Corroborating Evidence of Study 1	
First-Order Concept	**Corroborating Interview Quote**
Usage-Pattern-Driven Iterations & Tailoring	*"Not necessarily new systems, only some additional features to add based on practical needs. For example, if a supplier has significant decision-making power, the tracking process and nodes may be highly coordinated. If there is limited interaction with the supplier and their level of digitization is low, the corresponding processes will try to simplify their operations and requirements... In this way, upgrades and iterations are carried out based on their usage patterns."– Manager of the Supplier Chain Operations Centre*
Responsive Guidance & Mentorship	*"Whenever we have specific inquiries, they [Topsun] guide us promptly without hesitation…When first adopted the Dragon Gate, we had many questions... We frequently reached out to their team for instructions and held numerous video meetings on it… They served as mentors to help us navigate these processes."* *– Business Manager A of Supplier A*
Timely Issue Resolution	*"If there are any issues or abnormality, they help us with it as soon as they can. They were there holding our hands." – Business Manager of Supplier B*
Credit-Linked Lending System	*"During payment terms for suppliers, they may lack enough funds for ongoing operation…Our licensed financial teams provide loans to them using inventory accounts receivable as collateral. We've innovated this model, providing annual loans totaling 4 billion to suppliers and generating additional revenue through digital transactions on Outsideasy." – CDO* *"…Another aspect is our supply chain finance system on Outsideasy. Our suppliers often need financing, and we have a lending system… linked to our database for credit checks. For example, if we owe them 1 million, they can borrow… 700,000 or 800,000. We provide these services to some SMEs to strengthen our collaboration with suppliers." – R&D Manager*
Platform-based Risk Control	*"It's not only about online processing of contracts, we also enabled a third-party certification process…In the event of disputes or lawsuits, having these digitally signed contracts provides a legal basis for litigation. By ensuring legal compliance, critical nodes along our business processes are secured…the entire financial risk control framework is supported by Outsideasy." – Deputy Head of IT*
Service Reconfiguration for B2B Connection	*"The core of our approach now is to help them [SN participants] with the search…it's a reconfiguration of our service, where we reassemble and integrate the key elements – IT, finance, and the industry."– CDO*
Outcome-Oriented Platform Design	*"When conducting field research, I heard the SMEs talk about Platform X [anonymized B2B platform], which requires an annual fee…yet they are in a dilemma…if they pay it, they can still receive a few daily inquiries looking for suppliers or buyers…but most of these are junk inquiriea…the platform does help with handshaking, which is useful in getting some traffic, but with very low number of valid transactions…But our platform and approach are based on our core tangible businesses, which is promising in bringing actual orders [to the participants]. There is a fundamental difference."– Deputy Head of IT*

Table 12: Study 1 Glossary	
Term	Definition
Andon	A visual system used to signal issues or abnormalities in the production process, enabling immediate response and corrective action to maintain quality and efficiency in lean manufacturing.
CAM	Computer-Aided Manufacturing (CAM) system is a software used to control machine tools in manufacturing workpieces, and it can also involve using a computer to assist in various operations within a manufacturing plant. CAM aims to speed up production, ensure precise dimensions, minimize waste, and reduce energy consumption.

Core Firm	An entity that drives the value of an SN and coordinates suppliers via “compatibility and direct network management” (Pierce 2009, p. 324).
CMMS	A Computerized Maintenance Management System (CMMS) is a software that assists maintenance planners, schedulers, and technicians in managing maintenance tasks and enhancing asset reliability. It includes a centralized database for maintenance data and features like condition monitoring, inspections, checklists, KPI tracking, and documentation, vital in regulated industries.
EAM	Enterprise asset management (EAM) encompasses the oversight and upkeep of a company's physical assets throughout their entire lifecycle. This includes phases such as capital planning, procurement, installation, performance monitoring, maintenance, compliance, risk management, and ultimately, asset disposal.
Intrinsic Motivation for DT	Stakeholders’ self-driving enthusiasm to proactively engage in DT initiatives and adapt to the evolving organizational culture of ongoing DT(Tremblay et al. 2009).
MES	A Manufacturing Execution System (MES) is a comprehensive software system that dynamically monitors, tracks, documents, and controls the entire manufacturing process, from raw materials to finished products.
MPS	A Master Production Schedule (MPS) system develops detailed plans specifying what commodities will be produced, how much, and when, integrating production, staffing, and inventory considerations. It optimizes production processes, identifies bottlenecks, and forecasts resource needs, crucially impacting profitability. MPSs are often generated using software, with adjustments made by users to ensure accuracy and effectiveness.
RFID System	Radio Frequency Identification System s a technology that uses radio waves to identify and track RF tags attached to objects wirelessly.
TPM	Total Productive Maintenance (TPM) is a software system to facilitate the systematic maintenance that aims to engage all levels and functions in an organization to maximize the overall effectiveness of production equipment.
Supply Network (SN)	A complex system of interconnected entities of producing and distributing tangible goods globally, which evolved from supply chain management (SCM) to account for the fact that firms are typically not only part of a linear supply chain but a number of supply chains with heterogeneous interdependent and alternative clients and suppliers.
Supply Network Digital Transformation (SNDT)	The comprehensive integration and application of combinations of digital technologies across different entities within a supply network to enhance overall efficiency, agility, and competitiveness, which emphasizes inter-organizational collaboration, resource sharing, and the development of unified digital strategies that collectively transform the entire supply network.
SRMS	A Supplier Relationship Management System (SRMS) is a software application designed to manage and optimize interactions and with vendors that supply an organization with goods, materials, and services throughout the procurement lifecycle.
Work-hour-based Floor Management Systems	Software systems that provide real-time updates on wages based on production hours, offering transparency. They also track personnel responsibilities to facilitate efficient management of factory floor operations.

Appendix B: Supplementary Information for Study 2

Table 13: Sample Interview Guide for Study 2	
Table 3: Thematic Interview Protocol for CIC's IT Manager	
Theme	**Sample Questions**
History & Culture of CIC	• What is the history of CIC? • How has CIC expanded its global coverage over the years? • How would you describe the leadership style in CIC? • How is CIC's culture different from for-profit organizations? • How is CIC's culture different from other religious organizations?
DT Journey of CIC	• Could you recount the digital transformation journey of CIC? • How has the vision of digital transformation in CIC evolved? • What are the prerequisites for the successful digital transformation of CIC? • What would you say would be the difference between those DT initiatives that succeed or prove to be effective and those that are not?
History & Culture of CIC	• What is the history of CIC? • How has CIC expanded its global coverage over the years? • How would you describe the leadership style in CIC? • How is CIC's culture different from for-profit organizations? • How is CIC's culture different from other religious organizations?
Resource Management Strategy in CIC	• What are the key resources CIC needed and/or made available for its DT initiatives? • How would you describe the differences between the characteristics of CIC's resources and those in general commercial businesses? • How would you describe CIC's resource acquisition process? • How would you describe CIC's resource mobilization strategies?
Implication of COVID-19 on CIC's DT Journey	• How would you describe the role of COVID-19 in CIC's DT progress? • How would you describe the short-term & longer-term implications of COVID-19 to CIC's DT journey? • Could you describe how the pandemic influenced or catalyzed change in terms of using IT at the church?

Table 14: Data Structure for the Emergence of Resource Fluidity		
First-Order Concepts & Illustrative Quotes	**Second-Order Themes**	**Aggregate Dimensions**
Reliance on volunteers for core operations ("*The church hasn't risen and fallen on paid staff… it's risen and fallen on passionate volunteers.*" – Inf #1)	Transient resource access (as motivational driver)	**Identification**
Maintaining relationships and community trust ("*We use a lot of volunteers… we just gonna make sure we always keep the culture that we care about the people*." – Inf #3)	Accountability requirements (as motivational driver)	
Resource scarcity requiring careful prioritization ("*We don't have the luxury of being able to staff everything we do*." – Inf #1)	Need for frugality	
Strategic search for adaptable, multipurpose tools ("*Facebook groups really held the campuses together… it was a great way to communicate to our people.*" – Inf #9)	Identify and gain access to resources with polymorphic potential	
General-purpose nature of digital tools ("*The use of IT and computers was not just for administration… but also for creating content*." – Inf #8)	Non-specificity	
Human and digital adaptability ("I know how to learn something really quickly and then able to teach people simple as well." – Inf #3)	Adaptability	
Urgency created by lockdown ("In the church office, we had just literally two days before the lockdown announced." – Inf #2)	Crisis as activation trigger	**Activation**
Recognition of digital expansion opportunities ("The world is online… and we're crazy if we don't see that as an opportunity." – Inf #4)	Opportunity as activation trigger	
Strategic foresight and sensemaking ("We sat down as a team and had a look at every area of the church… how we best going to reach these people." – Inf #1)	Envisioning capability	
Reassigning roles for digital readiness ("A full-time pastor runs into being an online campus pastor." – Inf #10)	Redeployment capability	
Combining and mobilizing resources rapidly for livestream setup ("We pretty much drove around to four locations and set up mini-studios." – Inf #10)	Resource fluidity	
Low-cost improvisation and iterative learning ("We try to aim for excellence… but we are tight on budget… we play around, make mistakes, and learn." – Inf #3)	Experimentation capability	
Balancing innovation and mission integrity ("We have to balance that it doesn't just become a show… we want to reach people." – Inf #4)	Mission-driven governance	**Application**
Coordinated digital message across ministries ("We have a heart to use media as outreach to reach the world." – Inf #8)	Digital coherence	
Aligning tasks to skills and motivation	Fit-for-purpose	

("We look for the passionate person who's going to have the stickability to pursue that training." – Inf #2)		
Leveraging volunteer passion for sustained involvement ("People feel like being part of the family and want to help make the place technological." – Inf #8)	Cost-efficiency	