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From Resource to Capital: A Data-Based View Framework for Digital Transformation in Financial Institutions

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Abstract: Financial institutions face an unprecedented imperative to transform their operational logic from product-centric models to data-driven architectures, yet existing digital transformation frameworks remain dominated by technology adoption perspectives that fail to theorize data as a core strategic production factor. This conceptual paper proposes a data-based view (DBV) framework—integrating the resource-based view, dynamic capabilities theory, and the DIKW hierarchy—to explain how financial institutions systematically transform data from a raw resource into strategic capital. The framework comprises four interconnected layers: Data Foundation (multi-source heterogeneous data acquisition and governance), Dynamic Capability (AI-powered analytical and algorithmic capabilities), Value Realization (the pathway from data assetization to data capitalization), and Organizational Wisdom (strategic decision-making at the apex of the DIKW pyramid). Regulatory compliance is theorized as a moderating variable that can exert both constraining (compliance drag) and catalyzing (compliance push) effects on the data-to-capital transformation process. We develop six testable propositions that specify the framework's core relationships and provide directions for future empirical research. The DBV framework contributes to digital transformation scholarship by shifting analytical focus from technology adoption to data-driven strategic resource logic, while offering practical guidance for banking practitioners navigating digital transformation within tightly regulated environments.

Keywords: Data-based view; Digital transformation; Financial institutions; DIKW hierarchy; Dynamic capabilities; Regulatory compliance; Banking

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1. Introduction

The financial services industry is undergoing a profound structural transformation driven by digital technologies, evolving customer expectations, and FinTech competition [1]. Incumbent banks face an existential imperative to reconfigure from product-centric legacy architectures toward data-driven, platform-based operating models capable of delivering real-time, personalized services. Despite proliferating research on digital transformation, dominant frameworks have adopted a technology adoption perspective, emphasizing AI, blockchain, and cloud deployment [2,3]. While valuable, these contributions treat data as an enabler of technology deployment rather

than a core strategic production factor, obscuring a more fundamental question: How do financial institutions systematically transform data from a raw resource into strategic capital that drives sustainable competitive advantage?

The resource-based view (RBV) of the firm [4] provides the theoretical cornerstone, yet data's unique attributes—non-rivalry, reusability, near-zero marginal reproduction cost, and context-dependency—challenge traditional VRIN criteria [5,6]. We propose a data-based view (DBV) extension, positing that data constitutes a distinct category of strategic resource whose value follows a structured transformation pathway from raw observation to organizational capital. Banking's tightly regulated environment—characterized by stringent compliance, systemic interconnectedness, and heightened trust and stability imperatives [7,8]—makes it an ideal setting for developing this framework, given financial services' unique status as both the most data-intensive and most heavily regulated sector of the global economy. Specifically, we ask: (1) How can the DBV be conceptualized as a multi-layered framework for financial institution digital transformation? (2) What role does the DIKW hierarchy play in structuring the data-to-capital pathway? (3) How does regulatory compliance moderate data capabilities–performance relationships? Our contribution is threefold: we synthesize RBV, dynamic capabilities, and DIKW into a coherent DBV; we propose a four-layer framework tailored to financial institutions; and we develop testable propositions operationalizing core DBV relationships.

2. Literature review

The RBV [4] posits that firms achieve sustained competitive advantage through VRIN resources, extended by dynamic capabilities theory emphasizing resource orchestration [9,10]. However, data's distinctive properties—non-rivalry, reusability, near-zero marginal reproduction cost, and context-dependency—fundamentally challenge RBV's scarcity assumption [5,6]. Wei and Ying [11]laid the groundwork for the DBV, proposing data as the strategic fuel of the digital enterprise and shifting focus from resource ownership to resource activation. The conceptual chain from data resource to data asset to data capital represents a progressive value-enhancement pathway—raw observations, curated datasets, and capital generating measurable economic returns [12,13]—where data's strategic value is not innate but achieved, a product of organizational capabilities [14].

Existing frameworks for financial digital transformation fall into three categories: technology-centric models emphasizing AI, blockchain, and cloud adoption [2,3]; maturity-stage models such as the AATIT five-stage model—Awareness, Assimilation, Transformation, Integration, Transcendence [15]; and strategic adaptation frameworks including [1] disruption–adaptation duality. Despite these contributions, the literature lacks a unified framework positioning data—rather than technology or processes—as the central strategic resource around which financial digital transformation is organized.

The Data–Information–Knowledge–Wisdom (DIKW) hierarchy [16,17] provides a processual lens for mapping the data-to-capital transformation: data represents raw observations, information is data organized into meaningful patterns, knowledge is information internalized through interpretation and analysis, and wisdom is the capacity to apply knowledge with strategic judgment. In financial services, this progression is readily observable: institutions generate vast streams of transactional and behavioral data, structured into risk indicators and customer profiles (information), analyzed through predictive models for credit decisions and fraud detection (knowledge), and ultimately integrated into strategic judgment about product innovation and long-term competitive positioning (wisdom) [18]. Critically, many institutions remain "data-rich but insight-poor" [5]: they possess enormous data repositories but lack the organizational capabilities to ascend the DIKW ladder. The DIKW hierarchy also aligns with the DBV's data-to-capital pathway: the data-to-information transition maps to data assetization, the information-to-knowledge transition to data capitalization, and organizational wisdom

represents the pinnacle of data-driven maturity.

3. Theoretical framework: A data-based view for financial institutions

3.1. Framework overview

Building on these three streams, we propose a four-layer DBV framework integrating the DIKW hierarchy as its processual backbone and incorporating regulatory compliance as a moderating condition. **Figure 1** presents the architecture: four vertically stacked layers—Data Foundation (multi-source data acquisition and governance), Dynamic Capability (AI-powered analytical capabilities), Value Realization (from data assetization to data capitalization), and Organizational Wisdom (strategic decision-making at the DIKW apex)—with a horizontal moderating layer—the Regulatory Compliance Environment—permeating the entire structure.

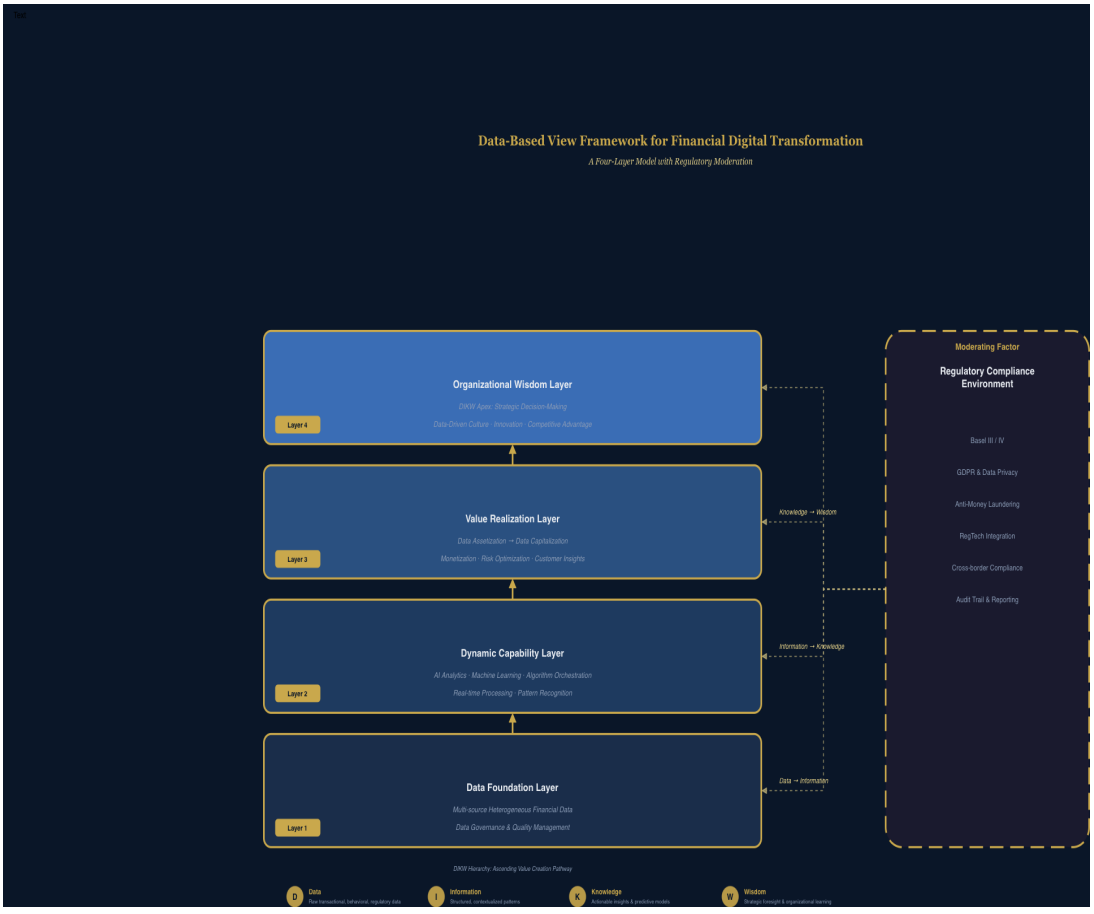

Figure 1. The DBV four-layer framework for financial institution digital transformation. The DBV four-layer framework diagram shows the four vertically stacked layers (Data Foundation, Dynamic Capability, Value Realization, Organizational Wisdom) with Regulatory Compliance Environment as a horizontal moderating layer, and the DIKW Hierarchy as the ascending value creation pathway.

3.2. Layer 1: Data foundation

The Data Foundation layer constitutes the infrastructural bedrock, encompassing capabilities to acquire, govern, and integrate multi-source heterogeneous financial data from core banking, customer interactions, market feeds, and third-party partnerships [7]. Three sub-capabilities define this layer: data acquisition, data governance (policies ensuring accuracy, privacy, and security) [19], and data integration. Its output is structured, governed information corresponding to the Data-to-Information DIKW transition. Critically, data foundation quality sets

the upper bound for all subsequent value creation [14].

3.3. Layer 2: Dynamic capability

The Dynamic Capability layer represents the analytical engine, transforming governed information into actionable knowledge. Drawing on Teece's studies [10,20], it comprises: AI/ML analytical processing (machine learning, NLP, computer vision), algorithmic modeling (institutional capacity to design, validate, and monitor models), and organizational sensing, seizing, and transforming—scanning for data-driven opportunities, mobilizing resources, and reconfiguring structures. Its output is actionable knowledge, corresponding to the Information-to-Knowledge DIKW transition.

3.4. Layer 3: Value realization

The Value Realization layer operationalizes the DBV's core claim: data becomes capital only when systematically deployed to generate measurable economic value. Value manifests through three channels: revenue generation (personalized products, algorithmic trading), risk optimization (improved credit assessment, fraud prevention), and customer value creation. The theoretical significance lies in the insistence that data value is realized rather than possessed—consistent with Teece's argument that data assets require complementary assets to generate returns.

3.5. Layer 4: Organizational wisdom

The Organizational Wisdom layer represents the apex—where data-driven knowledge is synthesized into strategic judgment, ethical governance, and adaptive learning [17,18]. Wisdom manifests as strategic foresight (anticipating market shifts, identifying emerging customer segments, and reading early regulatory signals), ethical governance (aligning data deployment with long-term stakeholder interests and societal expectations), and adaptive learning (continuously updating strategic frameworks and mental models through systematic reflection on data-driven experience). It is an emergent property arising from recursive interaction between robust foundations, sophisticated analytics, and value-realizing processes, orchestrated through strategic leadership and an organizational culture that values data-informed judgment over intuition alone.

3.6. Moderating factor: Regulatory compliance environment

A distinctive feature of the DBV framework is the recognition that regulatory compliance fundamentally shapes the conditions under which data can be transformed into capital [7,8]. Compliance moderates through three mechanisms: data governance mandates (GDPR, BCBS 239) shaping the Data Foundation layer; model risk regulations (SR 11-7, EU AI Act) imposing validation requirements on the Dynamic Capability layer; and capital adequacy requirements (Basel III/IV) structuring demand for data-driven analytics. The direction is theoretically complex: stringent compliance can inhibit data utilization—a "compliance drag" effect—yet can also catalyze infrastructure investment and quality improvement—a "compliance push" effect. The net effect is contingent on institutional factors such as regulatory maturity and strategic orientation.

4. Propositions development

4.1. Data foundation and digital transformation performance

The DBV framework generates six testable propositions grounded in its theoretical logic, each articulated in forms amenable to future empirical investigation.

The foundational premise is that superior data governance enables superior downstream outcomes. In

financial services, data foundation quality—accuracy, completeness, timeliness, consistency, security—determines the reliability of all analytical processes. Decisions based on flawed data propagate errors compounding through risk models and regulatory reporting [14,19].

Proposition 1 (P1): Data governance maturity is positively associated with digital transformation performance in financial institutions, such that institutions with higher levels of data foundation quality (accuracy, completeness, consistency, security) achieve superior outcomes in efficiency gains, customer experience improvement, and innovation capacity.

4.2. AI analytical capability as a mediating mechanism

The DBV posits that data foundations enable value creation through analytical capabilities that transform governed data into actionable insights. AI/ML analytical capability serves as the critical transmission mechanism between data infrastructure investment and realized business value [3,6].

Proposition 2 (P2): AI/ML analytical capability positively mediates the relationship between data foundation quality and value realization, such that the effect of data governance maturity on revenue generation, risk optimization, and customer value creation is transmitted through the institution's analytical processing capacity.

4.3. Regulatory compliance as a moderator of data capitalization

The pervasive influence of regulatory compliance on data practices is a defining feature of financial services. Drawing on the "compliance push" versus "compliance drag" distinction (Section 3.6), we propose that regulatory stringency exerts a non-linear moderating effect on the data capitalization–performance relationship: at low to moderate stringency, compliance catalyzes infrastructure investment and enforces data quality standards [8]; beyond a threshold, excessive burden increases governance costs and suppresses marginal returns [7].

Proposition 3 (P3): The regulatory compliance environment moderates the relationship between data capitalization and organizational performance in an inverted U-shaped pattern, such that moderate regulatory stringency enhances the positive effect of data capitalization on performance (compliance push), while excessive stringency attenuates this effect (compliance drag).

4.4. Dynamic capabilities as sequential enablers

The DBV's layered architecture implies sequential dependency: Layer 2 capabilities draw upon Layer 1 foundations, and Layer 3 value realization draws upon Layer 2 outputs. The sensing-seizing-transforming triad maps onto DBV's value creation: sensing identifies data-driven opportunities; seizing mobilizes analytical resources; transforming sustains data-driven value creation over time [15,20].

Proposition 4 (P4): Dynamic capabilities (sensing, seizing, transforming) partially mediate the relationship between data foundation quality and value realization, such that data governance maturity enhances value realization both directly and through the strengthening of organizational dynamic capabilities.

4.5. The emergence of organizational wisdom

The Organizational Wisdom layer represents the framework's ultimate theoretical contribution: sustained data-driven transformation yields a qualitatively distinct capability—wisdom—that transcends operational efficiency to encompass strategic foresight, ethical judgment, and adaptive learning. Wisdom is not merely accumulated knowledge but the capacity to exercise discerning judgment about when, how, and for what purposes data capital should be deployed.

Proposition 5 (P5): Organizational wisdom—operationalized as the integration of strategic foresight,

ethical governance, and adaptive learning—is positively associated with long-term institutional resilience and stakeholder trust in financial institutions, over and above the direct effects of operational performance metrics.

4.6. DIKW progression as a cumulative process

The DIKW hierarchy embedded in the DBV implies that the data-to-wisdom transformation is cumulative and sequential: each stage builds upon the preceding stage, creating a "weakest link" dynamic where deficiencies at any layer constrain performance at all subsequent layers. Investments in advanced AI without commensurate data governance yield suboptimal returns; value realization mechanisms without reliable analytical insights fail to produce sustainable capital returns.

Proposition 6 (P6): The DIKW progression within the DBV framework is cumulative and complementary, such that deficiencies at any layer (Data Foundation, Dynamic Capability, or Value Realization) negatively moderate the positive effect of adjacent layers on organizational outcomes, creating a "weakest link" constraint on overall framework performance.

4.7. Summary of propositions

Table 1 provides a consolidated overview of the six propositions, specifying independent variables, dependent variables, mediating/moderating mechanisms, and underlying theoretical mechanisms.

Table 1. Summary of theoretical propositions

Proposition	Independent variable	Dependent variable	Mechanism	Theoretical basis
P1	Data Governance Maturity	Digital Transformation Performance	Direct effect	RBV, Data Quality Theory
P2	Data Foundation Quality	Value Realization	Mediation via AI/ML Capability	Dynamic Capabilities, DIKW
P3	Data Capitalization	Organizational Performance	Moderation by Regulatory Compliance (inverted U)	Institutional Theory, RegTech
P4	Data Foundation Quality	Value Realization	Partial mediation via Dynamic Capabilities	Teece [10,20]
P5	Organizational Wisdom	Institutional Resilience & Trust	Direct effect	DIKW, Stakeholder Theory
P6	Cross-layer complementarity	Framework Performance	Negative moderation by layer deficiency	Systems Theory, DIKW

5. Discussion

This paper addressed a significant theoretical gap in the digital transformation literature: the absence of a strategic resource perspective positioning data—rather than technology adoption—as the central organizing construct for financial digital transformation. Drawing on RBV, dynamic capabilities, and the DIKW hierarchy within banking's distinctive regulatory context, we proposed the DBV as a four-layer framework tracing data from raw resource to strategic capital.

5.1. Theoretical contributions

Our framework makes three primary theoretical contributions. First, we advance the DBV by articulating its conceptual architecture and distinguishing it from traditional RBV: while VRIN criteria were developed for

tangible, rivalrous resources, data's distinctive properties require a theoretical apparatus shifting attention from "what data do we own?" to "how do we activate data to generate capital?" [6,10]. Second, we integrate three disconnected theoretical streams—RBV/dynamic capabilities, financial digital transformation, and DIKW—into a coherent framework. Prior work treated these as separate domains; by integrating them, the DBV demonstrates synergies none achieves in isolation. Third, we theorize regulatory compliance as a generative moderating variable rather than a mere contextual constraint. The "compliance push" versus "compliance drag" distinction introduces nuance: regulation can simultaneously constrain and catalyze data capability development [7,8].

5.2. Practical implications

For banking practitioners navigating digital transformation, the DBV framework offers several actionable insights. Prioritize data foundation before advanced analytics: analytical sophistication deployed on unstable data foundations yields unreliable insights and magnified operational and regulatory risk (Proposition 1). Treat regulatory compliance as a strategic capability rather than a cost center: requirements like BCBS 239, GDPR, and SR 11-7 can be leveraged as catalysts for building enterprise-wide data governance and model risk management capabilities that simultaneously satisfy regulators and enhance business outcomes (Proposition 3). Measure transformation progress across all four layers—data quality metrics (Layer 1), model accuracy and throughput (Layer 2), revenue uplift and risk-adjusted returns (Layer 3), and strategic decision quality and speed (Layer 4)—rather than focusing narrowly on technology adoption rates. Recognize the "weakest link" dynamic: Proposition 6 highlights that DBV layers are complementary, not substitutable, requiring balanced, simultaneous investment across all four to realize the full data-to-capital pathway.

6. Conclusion

This paper has proposed a DBV framework for understanding digital transformation in financial institutions—a theoretical architecture tracing data from raw resource to strategic capital through four interconnected layers: Data Foundation, Dynamic Capability, Value Realization, and Organizational Wisdom. Grounded in RBV, dynamic capabilities, and the DIKW hierarchy, the framework departs from technology-centric perspectives by positioning data as the central strategic resource around which financial digital transformation is organized, moderated by banking's distinctive regulatory compliance environment.

We have developed six testable propositions specifying direct effects of data governance on transformation performance, mediating roles of AI capability and dynamic capabilities, the moderating effect of regulatory compliance, and the cumulative complementarity of the DIKW progression. The journey from resource to capital is not automatic—it requires deliberate investment in data infrastructure, sustained cultivation of analytical capabilities, strategic deployment into value-creating processes, and organizational maturity to exercise wisdom in data's application. By making explicit the layered mechanisms through which data generates competitive advantage, the DBV framework provides both a theoretical language for understanding this journey and a practical compass for navigating it.

Disclosure statement

The author declares no conflict of interest.

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