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Dancing titans: Dual orchestration and governance in industrial digital platforms for B2B value co-creation

Annabeth Aagaard [a,*], Wim Vanhaverbeke [b], Oliver Gassmann [c]

[a] Aarhus University, AU BSS, Department of Management, Aarhus, Denmark
[b] University of Antwerp, Department of Management, Antwerpen, Belgium
[c] St. Gallen University, Institute of Technology Management, St. Gallen, Switzerland

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ABSTRACT

The digitization of industrial ecosystems positions B2B industrial digital platforms as central to value co-creation and co-capture. While B2C platform governance is well-researched, few studies examine how manufacturing firms and platform providers collaboratively govern digital business models (DBMs) in B2B platform settings. Our study addresses this gap through a multiple case study of five platform providers and five B2B manufacturers, drawing on 33 semi-structured interviews and document analysis. We introduce the concept of dual orchestration—a governance approach in which platform providers and manufacturers jointly assume and adapt orchestration roles across DBM phases. We develop the Platform DBM Process Model (Figure 1), which illustrates how governance dynamics and relational mechanisms – transparency, reciprocity, commitment, proximity, and coopetition - enable dual orchestration through joint role adaptation. We present the Dual Orchestration Governance Framework for Industrial Platform DBMs (Figure 2), integrating DBM phases, relational issues, and governance mechanisms to theorize dual orchestration as a dynamic co-governance process. The study contributes to platform governance theory by specifying the structural and relational features of dual orchestration and by providing an empirically grounded account of its evolution.

1. Introduction

Manufacturing firms are undergoing significant changes as digital transformation accelerates, with digital platforms playing a central role in fostering innovation and maintaining competitiveness (Nambisan et al., 2019; Kohtamäki et al., 2024). In B2B settings, industrial platforms enable digital servitization and DBMs by connecting IIoT assets, harnessing data insights, and promoting ecosystem-wide collaboration (Jovanovic et al., 2022). As a result, industrial digital platforms transform value co-creation by linking internal and external stakeholders and their data (Veile et al., 2022; Sjödin et al., 2022), fostering information exchange, and developing digital services and DBMs (Sklyar et al., 2019; Fu et al., 2023). Their widespread adoption in manufacturing drives fundamental shifts in business development, triggering substantial digital transformations (Aaldering and Song, 2021; Ghosh et al., 2022) of business models, value creation, and value capture (Zhao et al., 2020; Gawer, 2021; Granstrand, 2024). The benefits of co-creating value through digital business models (DBMs) on industrial digital platforms include reducing transaction costs, amplifying network effects, and strengthening relational dynamics among co-creating partners (Veile et al., 2022), while also emphasizing collaborative innovation and data-driven decision-making (Täuscher and Laudien, 2018; Cusumano et al., 2020; Adner, 2022). However, the dynamics of co-creating and co-capturing value in platform-based DBMs are inherently complex (Sjödin et al., 2020). Unlike conventional linear models of value co-creation, platform-based approaches rely on a triadic structure that integrates multiple actors through the intermediary platform provider, mitigating traditional gatekeeping constraints (Jovanovic et al., 2022). While extant research typically conceptualizes orchestration as a unilateral and relatively stable activity directed by platform providers, industrial B2B platforms may involve more distributed and dynamic governance arrangements (Chen et al., 2022). Yet how such governance unfolds in practice and how orchestration roles are adapted over time remains underexplored. Given these unique characteristics, a more systematic empirical investigation into the mechanisms of DBM value co-creation within digital platforms is essential, as emphasized by

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* Corresponding author.
E-mail address: aaa@mgmt.au.dk (A. Aagaard).

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several authors (Adner and Kapoor, 2010; Zhao et al., 2020; Dalenogare et al., 2023).

Existing research on platform-based value co-creation primarily examines business-to-consumer (B2C) contexts, such as Facebook (Lee et al., 2015) and multi-sided platforms like Airbnb (Zervas et al., 2017), while B2B collaborations have been comparatively underexplored (Kohtamäki and Rajala, 2016; Markovic et al., 2021; Aagaard and Rezac, 2022). In B2C platform ecosystems, governance is often more centralized in the platform owner, yet relationships with complementors are not strictly competitive. Prior research demonstrates that such ecosystems are inherently coopetitive, as platform owners often stimulate complementary third-party innovation to meet heterogeneous user needs and exploit indirect network effects (Ceccagnoli et al., 2012; McIntyre and Srinivasan, 2017; da Silva and Cardoso, 2025). This coopetition arises because platform owners develop first-party complements that compete directly with third-party offerings, while simultaneously engaging in cooperative partnerships that co-create value (Cennamo, 2019; Cennamo and Santaló, 2019). For example, in the video game industry, console manufacturers like Sony compete with independent game publishers through their own first-party titles while also relying on these publishers to enrich the platform's value proposition. Whereas orchestration in B2C platforms is often unilateral and relatively stable, B2B industrial contexts involve greater technical interdependence, longer product life cycles, and more tightly coupled integration between digital and physical systems. These conditions suggest that governance may need to be shared and adapted across actors, yet prior research has offered little insight into how such distributed orchestration unfolds.

Prior research stresses the need to understand industrial B2B platforms from an inter-actor perspective (Hou and Shi, 2021; Jovanovic et al., 2022; Shree et al., 2021). Other studies by Veile et al. (2022), Tian et al. (2022) and Fu et al. (2023) emphasize the need for investigating how DBMs and platform-based servitization co-create value using industrial digital platforms. In addition, more knowledge is needed regarding how platform members govern their interactions to facilitate digital value co-creation, as underlined by several authors (e.g., Autio and Thomas, 2018; Kapoor et al., 2022; Granstrand, 2024). In this paper, we aim to generate new theoretical insights into how industrial digital platforms function as vehicles for B2B value co-creation through DBMs. Specifically, we focus on the collaborative, governance dynamics between platform providers and manufacturing firms, and the mechanisms that enable them to co-create and co-capture value. Accordingly, we address the existing research gap by exploring the following research question:

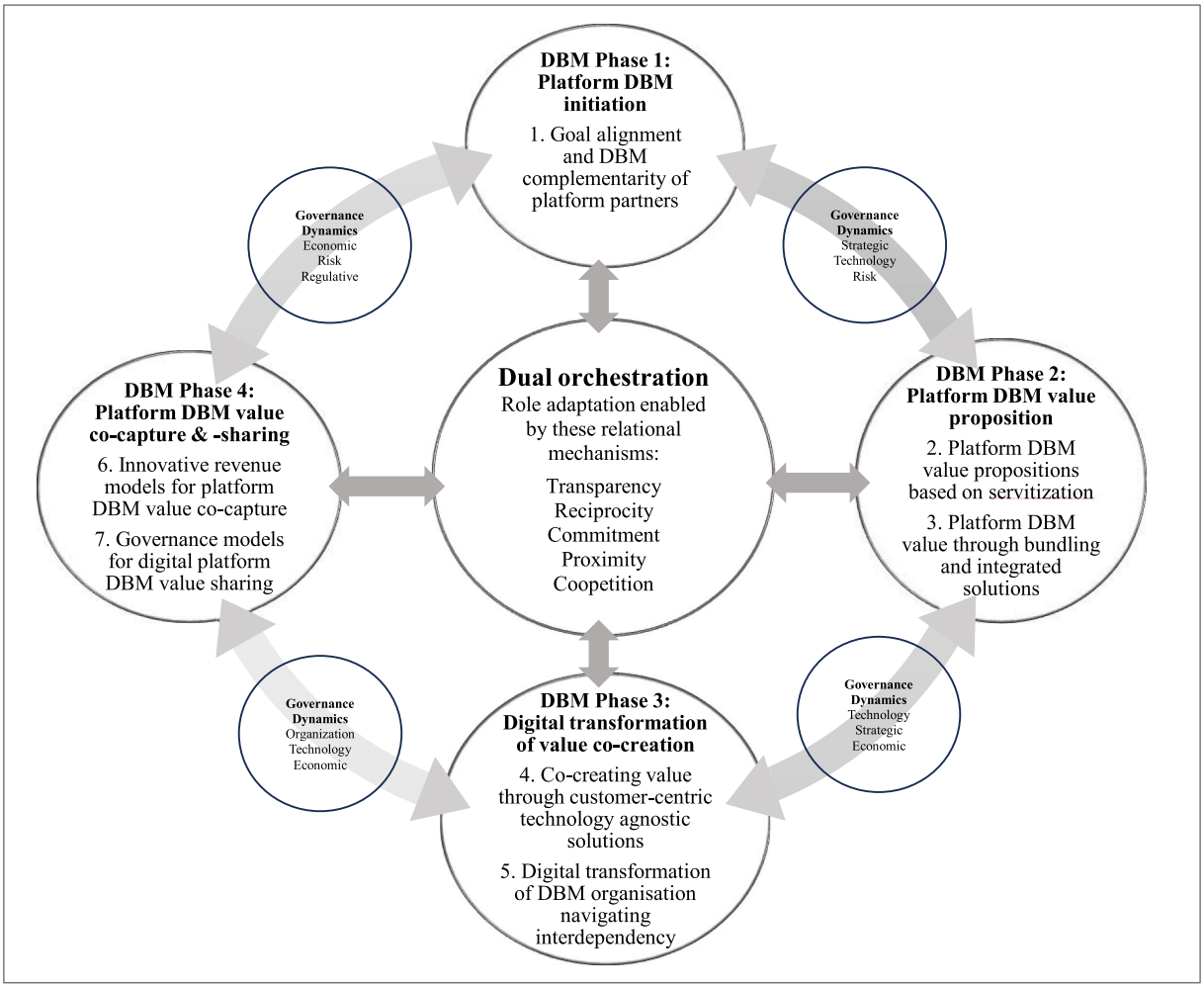

Fig. 1. Platform DBM process model.

"How do B2B manufacturing companies and platform providers collaboratively navigate and govern the processes and dynamics of value co-creation and value co-capture through digital business models in industrial digital platforms?

Our study is based on an in-depth case study with rich empirical data from ten leading B2B manufacturing firms and global platform providers. Drawing on 33 interviews with senior managers and directors, supplemented by company document analysis, the study identifies an iterative process of DBM development through platform-based interactions, captured in the Platform DBM Process Model (Fig. 1). By identifying eight managerial activities and six governance dynamics, we provide a phase-specific perspective on governing Platform DBM value co-creation and co-capture in industrial platforms. These insights are synthesized in the Dual Orchestration Governance Framework for Industrial Platform DBMs (Fig. 2), which identifies the relational issues and governance mechanisms that constitute a flexible model for managing DBM value creation and addressing governance challenges throughout platform DBM processes.

2. Theoretical background

In this section, we examine the core theoretical topics of industrial digital platforms and the dynamics of value co-creation using these platforms, presented in the following two subsections.

2.1. Industrial digital platforms

Industrial digital platforms centralize the collection and integration of industrial asset data to develop intelligent applications and services in collaboration with complementors (Jovanovic et al., 2022; Veile et al., 2022). Their emergence is driven by advances in cloud computing, edge computing, big data analytics, and artificial intelligence, accelerating the evolution of the Internet of Things (IoT) (Kiel et al., 2017; Paiola and Gebauer, 2020). These platforms enable organizations to innovate and interact in ways that generate non-linear increases in utility and value (Cusumano et al., 2019) and facilitate digital servitization by integrating products with digital services, enhancing the value propositions of manufacturing firms (Lusch and Nambisan, 2015; Dalenogare et al., 2023). Digital business models (DBMs) create and capture value through digital servitization by leveraging data and technologies tailored to customer needs (Aagaard, 2019; Paschou et al., 2020), and they are continuously evolving, using digital technologies in new ways to automate and enhance value-generating processes (Kohtamäki et al., 2024). Thus, for product-oriented firms, digital product-service innovation enhances innovation outcomes and expands profit margins (Davies et al., 2006; Kapoor et al., 2022; Bustinza et al., 2022).

Acting as both innovation and transaction platforms, industrial digital platforms collect and analyze data from various assets and devices, making them available to third-party firms that develop complementary digital services targeting specific customer problems (Gawer and Cusumano, 2014; Cusumano et al., 2020). These characteristics position industrial digital platforms as enablers of B2B value co-creation (Gawer, 2014; Paiola and Gebauer, 2020; Aagaard and Rezac, 2022). However, unlike consumer-oriented platforms, B2B manufacturers often specialize in tailored solutions rather than universal offerings, transaction-based revenue models, and alternative approaches to DBM value co-creation and co-capture. Accordingly, B2B manufacturing firms engage with industrial digital platforms to access technological expertise, integrate complementary capabilities, and realize joint digital value creation (Cennamo, 2018; Sjödin et al., 2020; Kapoor et al., 2022), while enabling innovations that individual firms cannot achieve alone (Hilbolling et al., 2020). Despite their potential, the application of industrial digital platforms for such advanced purposes remains in early development (Kiel et al., 2017; Hou and Shi, 2021; Jovanovic et al., 2022).

Industrial B2B platform governance differs from traditional joint ventures and cooperatives by prioritizing adaptability and technological mediation. Joint ventures rely on rigid contracts that ensure stability but limit flexibility (Luo, 2002; Hennart and Zeng, 2005; Han et al., 2022), while cooperatives emphasize egalitarian decision-making, fostering inclusivity at the cost of responsiveness (Bijman et al., 2014). In contrast, platforms integrate relational and technological governance through iterative and emergent mechanisms, allowing sponsors to co-develop governance structures with complementors and foster a dynamic, evolving ecosystem (Adner, 2017; Rietveld and Schilling, 2020). Additionally, platforms utilize modular architectures that facilitate scalability and seamless integration of new actors and functionalities, ensuring that governance remains adaptive to technological and market dynamics (Cennamo, 2019; Adner, 2022). In industrial B2B platforms, trust extends beyond dyadic partnerships and is anchored in both relational expectations and institutionalized practices. Whereas joint ventures typically reinforce trust through direct interaction and repeated exchange (Pera et al., 2016; Veile et al., 2022), platforms must sustain cooperation among heterogeneous actors through governance architectures that promote transparency, accountability, and credible commitments. We use Table 3 (Appendix) as a set of literature-based sensitizing concepts to contrast B2C platforms and joint ventures with industrial B2B platforms; these distinctions guided data collection and early coding.

2.2. The dynamics of DBM value co-creation in industrial digital platforms

Effective DBM value co-creation in industrial digital platforms requires robust governance mechanisms across different ecosystem development phases. In contrast to hierarchical supply chains, platform ecosystems foster non-hierarchical actor relationships (Jacobides et al., 2018; Cennamo, 2018; Cennamo and Santaló, 2019) and involve dynamic formation processes (Hannah and Eisenhardt, 2018; Rietveld and Schilling, 2020). Unlike B2C models, B2B ecosystems are governed by coopetition rather than winner-takes-all dynamics (Kretschmer et al., 2022; Adner, 2022; Jovanovic et al., 2022). Fundamentally, coopetition rests on the ability of firms to generate synergies that enable the pursuit of joint objectives while preserving strategic autonomy (Gnyawali and Charleton, 2018). Through the interplay of competition and collaboration, firms reduce risks, enhance the use of resources, and access opportunities that remain out of reach in exclusively competitive or purely cooperative arrangements (Bicen et al., 2021; Veile et al., 2022). Given the relatively equal bargaining power between platform providers and actors, along with high switching costs, B2B platforms require distinct governance structures that continually reconfigure roles and responsibilities across functional and organizational boundaries (Sklyar et al., 2019). Thus, coopetition in B2B platform ecosystems diverges significantly from B2C models, where competition centers on market dominance battles (Ritala and Hurmelinna-Laukkanen, 2009; Gnyawali and Charleton, 2018; Cennamo, 2019). Accordingly, developing digital business models (DBMs) on industrial platforms necessitates clear sequencing of activities, relational dynamics, and actor roles (Nambisan et al., 2017; Sjödin et al., 2019; Zeng et al., 2023). This requires balancing control over core technology while navigating uncertainty, as emphasized by several authors (Wareham et al., 2014; Dattée et al., 2017; Cennamo and Santaló, 2019).

In contrast to centralized governance (e.g., Apple, Google) or

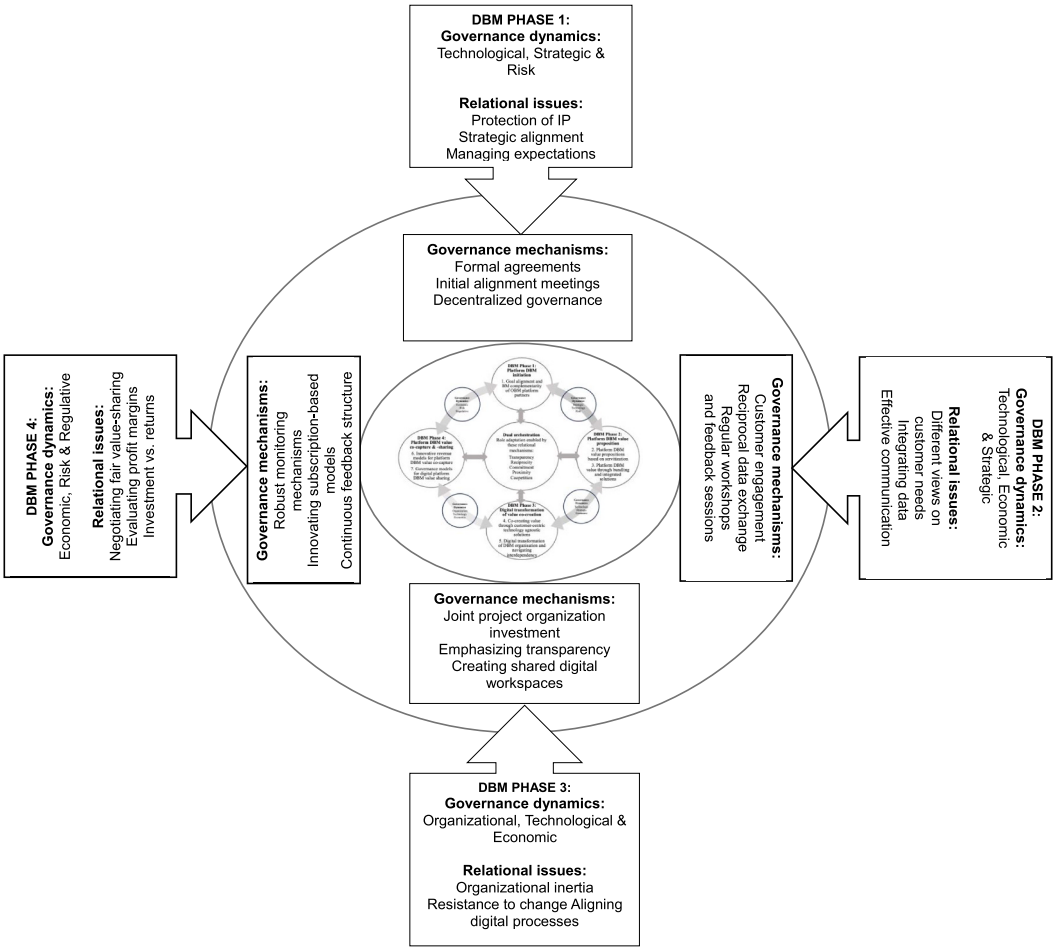

Fig. 2. Dual orchestration governance framework for industrial platform DBMs.

market-based governance (e.g., semiconductors), industrial digital platforms adopt shared governance, where multiple actors collaboratively shape ecosystem evolution (Wei et al., 2019; Li et al., 2022). Such governance requires continuous alignment of strategic intent, technical standards, and contractual safeguards to mitigate conflicts over roles, data rights, and competitive boundaries (Vasudeva et al., 2020; Hou and Shi, 2021; Thomas and Ritala, 2022). However, coopetition generates relational issues and tensions from divergent incentives and norms (Gnyawali and Charleton, 2018; Raza-Ullah, 2020; Cennamo and Santaló, 2019), which can only be effectively managed through reciprocity, sustained commitment, and mutual trust (Dalenogare et al., 2023). Prior research has shown that trust is central to sustaining interorganizational collaboration by reducing risk and stabilizing exchange relationships (Perrons, 2009; Brockman et al., 2018; Guo et al., 2021). In industrial platforms, trust develops incrementally through both cognition- and affect-based mechanisms (Legood et al., 2022) but also extends to institutional dimensions, where transparency practices, auditable data-sharing, and shared compliance routines reinforce confidence across heterogeneous actors (Vargo et al., 2024). Here, emerging technologies—including AI, blockchain, and cloud computing—strengthen transparency and trust while enabling more effective resource integration and adaptive decision-making. These technologies equip firms to reconcile competitive tensions with opportunities for collaboration (da Silva and Cardoso, 2025). Conventional theoretical perspectives struggle to capture the complexity and interconnectivity that characterize technology-driven coopetition networks like industrial platforms (Corbo et al., 2023). Consequently, further research is required to examine how firms systematically facilitate coopetition while fostering trust and relational dynamics in the process of value co-creation through industrial platforms (Brockman et al., 2018; Guo et al., 2021; da Silva and Cardoso, 2025).

3. Research method

This study aims to explore how platform providers (orchestrators) and established manufacturing companies (complementors) co-create and co-capture value through DBMs using industrial digital platforms. The case study deviates from examining the entire industrial platform ecosystem and instead focuses on the dual dynamics of the value co-creation process between large manufacturing companies and platform providers. Given the exploratory character of this research objective, we selected a qualitative research design to ensure a methodological fit between the research question and the status of the prior theory (Edmondson and McManus, 2007). The case study methodology is suitable for acquiring rich, detailed data (Eisenhardt and Graebner, 2007) and for identifying emerging themes and patterns (Eisenhardt, 1989) appropriate for generating new knowledge in contexts with limited theoretical background (McCutcheon and Meredith, 1993). Furthermore, we applied a multiple case study design to explore DBM value co-creation using industrial platforms across different

industrial and organizational contexts, allowing for more generalizable results than single-case studies (Yin, 2013).

3.1. Case selection and sampling

The case companies were selected theoretically to ensure that the sample covered a wide spectrum of market-leading platform providers as well as established B2B manufacturing companies representing the two sides of the industrial platform ecosystems and the unit of analysis. The case study was conducted using ten case companies: five platform providers: Case A, Case B, Case C, Case D, and Case E, and five established B2B[1] manufacturing companies: Case F,[2] Case G, Case H, Case I, and Case J (Table 4, Appendix). All case companies were publicly listed and are presented in anonymized form due to confidentiality. The case selection is based on theoretical sampling (Eisenhardt and Graebner, 2007), as the firms were particularly suited to illustrate how platform providers and B2B manufacturers co-create and co-capture value through platform-driven DBMs. All ten cases shared three features: (1) extensive experience in DBM development on industrial platforms, (2) recently completed processes of value co-creation, and (3) documented outcomes of value co-created and co-captured.

The selection of these specific cases was guided by theoretical replication logic (Eisenhardt, 1989; Yin, 2013), seeking variation across both industrial context and platform maturity while maintaining analytical comparability. The platform providers (Cases A–E) represent distinct technological architectures—from cloud-based ecosystems to IoT and AI-enabled industrial platforms—while the manufacturing firms (Cases F–J) embody leading actors within their respective sectors (e.g., heavy industry, pharmaceuticals, energy, and water management) engaged in advanced digital transformation initiatives. Each case was approached through prior research collaborations, industry consortia, or professional partnerships that enabled access to strategic-level informants under non-disclosure agreements. This ensured that each case provided deep insight into ongoing platform-based digital business model (DBM) collaborations while remaining within the confidentiality parameters agreed with corporate partners.

3.2. Data collection

In exploration of the research question, we carried out semi-structured interviews adhering to the interview guidelines detailed in Table 6 (Appendix). In total, 33 semi-structured interviews of 1–1.5 h were conducted and recorded with (2–4) senior-level managers, representing each of the ten case companies (Table 4, Appendix). For each case, we interviewed the most knowledgeable informants (Eisenhardt and Graebner, 2007), selected for their strategic involvement in digital business development and experience with DBMs in industrial platform collaborations. To ensure triangulation (Eisenhardt, 1989; Patton, 2015), we combined interviews with extensive document analysis (e.g., internal reports, corporate publications, and news media) across cases. This integration of archival and interview data enabled us to identify DBM process steps, mechanisms, dynamics, and activities involved in facilitating and governing value co-creation and co-capture. During interviews, informants described their most recent platform-based DBM projects while also reflecting on prior experiences. Given that all case companies were listed, informants avoided disclosing sensitive data, requiring full anonymization of firms and data. Interview protocols addressed partner selection, initiation, coordination, and progression of DBM collaborations; governance of value co-creation and co-capture; and the decision-making, roles, and dynamics shaping each DBM phase. Access to senior informants was secured through prior collaborations, industry consortia, professional networks, and corporate research offices. All interviews were confidential; several required NDAs, internal legal clearance, and secure sharing of archival materials.

3.3. Data analysis, validity, and reliability

Drawing on multiple sources enabled data triangulation, thereby enhancing construct validity (Sumrin and Gupta, 2021). We applied a comprehensive coding procedure to the 33 interviews and archival data to identify patterns of processes, activities, and choices (Yin, 2013; Cloutier and Ravasi, 2021). Following Braun and Clarke's (2006) thematic analysis method, we coded transcribed interviews and documents into underlying patterns and themes through several phases. The analysis evolved from an exploratory, inductive approach to the development of higher-order themes. In line with this, our initial coding comprised open NVivo coding (Corbin and Strauss, 2008; Miles et al., 2014). The first step involved a document analysis of the case companies (articles, reports, news, websites) to identify collaborations, DBMs, and value co-creation activities. In the second step, we developed a comprehensive list of codes from transcripts and NVivo, clustering and refining overlapping codes into underlying patterns and deriving first-order concepts, which were only retained if supported across all ten cases. We applied a constant comparison method through interviews, memos, and coding, moving iteratively between fieldwork and analysis. Coding began immediately after initial data collection, and themes were reformulated and integrated until analytical saturation was reached (Eisenhardt, 1989). Theoretical saturation was assessed through an iterative comparison across cases, ensuring that no new first-order concepts, relational mechanisms, or governance dynamics emerged in the final three interviews or in the last rounds of document coding. As additional data only reinforced existing categories without introducing new constructs, we concluded that saturation had been achieved at both within-case and cross-case levels. This assessment was further validated through joint coding discussions among all authors and external peer debriefing with two independent qualitative researchers familiar with DBM and platform studies. The data structure and analysis are summarized in Fig. 3 (Appendix) and maps the key managerial activities in the DBM process, and in Fig. 4 (Appendix) the key governance dynamics impacting the DBM process are illustrated.

4. Results

The analysis shows that the development of industrial platform DBMs unfolds through a recursive process of dual orchestration, where platform providers and manufacturing firms jointly reconfigure leadership, governance, and innovation roles over time. This process cannot be reduced to static orchestrator–complementor classifications but evolves across four interconnected phases—initiation, co-proposing, digital transformation, and co-capture. As illustrated in Fig. 1, these phases form interdependent arenas linked by dual arrows that indicate how collaboration progresses only through continuous iteration: partners frequently move forward, return to earlier activities, and recalibrate arrangements as conditions shift.

Progression is driven by specific managerial activities: aligning goals and business model complementarities, co-designing and validating customer-centric value propositions, embedding digital infrastructures and organizational routines, and negotiating revenue and value-sharing models. These activities are empirically grounded in recurring cross-case patterns and sustained by relational dynamics—trust, reciprocity, commitment, proximity, and coopetition—that enable the redistribution

[1] The case companies and conglomerate corporations, Case G and Case F, are focusing on both B2B, B2C, and B2G segments. Yet, the informants involved and the DBMs in this study are only B2B focused.

Additionally, while Case B is typically recognized for its B2C focus, the analyzed DBM case was B2B.

[2] In this study, Case F assumes a dual role as both complementor and orchestrator: through its platforms it operates as a platform provider in certain DBM value processes, while simultaneously acting as a hardware or software provider to, for instance, the platform of Case A.

of authority and responsibilities without destabilizing collaboration. Below Table 2 (Appendix) summarizes the structuring of these DBM phases by mapping each to its key activities, supporting quotes, and managerial actions, while also indicating the governance mechanisms mobilized to address dominant strategic, technological, economic, organizational, risk-related, and regulatory dynamics. The following subsections (4.1–4.4) elaborate these dynamics in detail, showing how initiation, co-proposing, digital transformation, and co-capture are empirically enacted, and how dual orchestration is sustained through iterative movement across phases, structured by the interplay of managerial activities, relational dynamics, and governance mechanisms.

To contextualize the anonymized cases, the ten firms represent a diverse cross-section of industrial sectors characterized by high technological interdependence and digital transformation intensity. The platform providers (Cases A–E) include global leaders in cloud computing, IoT connectivity, and industrial analytics, each orchestrating multi-sided digital ecosystems that integrate hardware, software, and data services. The manufacturing firms (Cases F–J) operate across heavy machinery, process industries, pharmaceuticals, and water infrastructure, each actively developing servitization and sustainability-oriented DBMs. Although anonymized for confidentiality, these details ensure interpretability by clarifying the industrial and organizational landscapes underpinning the study's findings.

4.1. Initiation of platform DBM

At initiation, platform providers and manufacturing firms come together to co-develop new digital business models (DBMs) through the joint alignment of objectives for the DBM and by ensuring complementarity of the DBM platform partners, as derived from Fig. 1.

Table 2 (Appendix) and Table 4 (Appendix) show, the cases provide concrete DBM examples and the roles of the collaborators across phases, which contextualize the entry conditions and role allocations relevant of this first phase. The study revealed that all four DBM phases were influenced by six governance dynamics—strategic, technological, economic, organizational, risk-related, and regulatory as derived in Fig. 2 and presented Table 5a. Importantly, while all six dynamics were present, they varied across the phases. The initiation phase was most directly influenced by strategic, technological, and risk-related dynamics (as summarized in Table 5a, Appendix), which interacted with relational mechanisms of trust, proximity, and reciprocity.

Strategic dynamics were particularly salient, as partners sought alignment of goals, complementarities in their DBMs, and a shared framing of customer value propositions. Interviewee 2 from Case C repeatedly emphasized that collaborations could not proceed without clear strategic fit: "*Our strategic goals have to align perfectly, which is crucial for the success of this partnership*." Similarly, interviewee 1 from Case D underlined the procedural importance of alignment: "*You have an initiation phase where you need to align your strategies and ensure that both partners are on the same page regarding the objectives of the collaboration*." Complementarity was identified as equally central in selecting between partners for the DBM collaborations: "*We need a complementary business model … Complementarity is crucial" - as* stressed by interviewee 4 from Case I. These observations illustrate how initiation was shaped not only by the search for scale but also by the careful delimitation of overlap and complementarity at the business-model level, laying the trajectory for subsequent phases (Table 2, Appendix).

Technological dynamics simultaneously influenced initiation, as platform providers assumed responsibility for establishing the interoperability and security standards necessary for onboarding. The early phases thus involved significant investment in architectures that could integrate heterogeneous industrial offerings. Interviewee 3 from Case G emphasized the importance of this backbone: "*The platform allows us to integrate various technologies seamlessly, making it easier to collaborate and innovate*." Providers framed interoperability and cybersecurity as non-negotiable prerequisites, while manufacturers viewed these commitments as enablers for contributing domain expertise and use-case logics without compromising control.

Risk-related dynamics were equally prominent. Partners expressed early concerns about intellectual property, data rights, and liability—concerns that were addressed through contractual safeguards, non-disclosure agreements, and pilot-stage protocols. Interviewee 3 from Case F described the need for formalization: "*Legal agreements and NDAs are put in place and aligned across the partners at this stage to mitigate any potential risks*." Interviewee 2 from Case H echoed this emphasis while highlighting the balance between protection and openness: "*Both companies protect their IP and legal rights through various mechanisms … to ensure that knowledge-sharing remains beneficial without jeopardizing proprietary innovations."* Together, these three dynamics illustrate how initiation was marked by iterative role negotiation rather than predetermined orchestration. Platform providers sought adoption and data access through secure and interoperable backbones, while manufacturers sought to preserve discretion over DBM design while embedding their offerings into broader ecosystems. Tensions emerged when providers pushed for standardized integration while manufacturers resisted

Table 1
Case examples of dual orchestration in B2B industrial digital platforms.

Platform Provider	Manufacturing Firm	Orchestration Dynamics	Example of Dual Orchestration
Case F (as platform provider – IoT platform, Open digital business ecosystem)	**Case G (as manufacturing firm – industrial IoT solutions)**	Case F provides the digital infrastructure, while Case G co-develops industry-specific applications and ensures adoption within manufacturing workflows.	Case F and Case G jointly define governance models for industrial IoT solutions, balancing platform openness with IP protection.
Case A (Cloud & AI)	**Case H (Industrial water solutions)**	Case A enables cloud-based analytics, while Case H ensures the DBM fits water industry requirements and customer needs.	Case A adapts its cloud platform for predictive maintenance in Case H's water pumps, adjusting governance to support industry-specific data use.
Case E (Enterprise Software & Data Platforms)	**Case I (Cement & Mining Equipment)**	Case E provides cloud-based industrial analytics, while Case I tailors these tools to environmental compliance and process efficiency.	Case E and Case I co-develop AI-driven sustainability monitoring, negotiating governance to ensure transparency in emissions tracking.
Case B (AI & Data Analytics)	**Case J (Pharmaceuticals & Biotech)**	Case B supplies AI-driven analytics, while Case J ensures regulatory compliance in data-driven drug development.	Case B adjusts platform governance to meet pharma regulations, co-developing GDPR-compliant AI models for patient data analytics.
Case C (Hybrid Cloud & AI)	**Case F (as manufacturing firm – Industrial Automation)**	Case C offers cloud-based AI solutions, while Case F integrates them into its automation and manufacturing processes.	Case C and Case F jointly orchestrate AI-driven industrial automation, ensuring seamless cloud integration while meeting industry standards.
Case D (5G & Industrial Connectivity)	**Case G (Smart Manufacturing & IoT)**	Case D provides industrial 5G connectivity, while Case G ensures solutions are scalable across factory environments.	Case D and Case G co-design edge computing solutions, balancing governance over real-time data access and cybersecurity risks.

premature lock-in. Governance adaptation in this phase therefore combined formal mechanisms—NDAs, IP-sharing agreements, contractual safeguards—with relational mechanisms such as co-location, joint workshops, pilot investments, and transparency routines.

Relational dynamics further reinforced these governance adaptations, as summarized and exemplified in Table 8 (Appendix). As shown in Table 4b (Appendix), several cases illustrate how partners managed issues of IP protection, strategic alignment, and expectation-setting through distributed decision-making and collective problem anticipation. Interviewee 2 from Case G emphasized joint risk management: *"By performing joint risk assessments, we ensured that both parties were aware of potential pitfalls and could plan accordingly."* Together, these mechanisms demonstrate that initiation was anchored not only in formal safeguards but also in embedding collaboration relationally at the structural and team level, thereby providing early legitimacy and enabling dual orchestration to take root.

In sum, initiation was not a discrete entry point but a process of negotiating complementarities under the influence of six governance dynamics, with strategic, technological, and risk-related concerns exerting the strongest impact in this phase. Crucially, initiation already revealed the core logic of dual orchestration: rather than a unilateral orchestrator–complementor configuration, partners mutually structured roles, with platform providers establishing technical backbones and governance safeguards, and industrial firms shaping strategic positioning and use-case logics. These early governance foundations carried forward across cases, enabling the scaling and institutionalization of dual orchestration in subsequent phases (Table 1; Fig. 2).

4.2. Platform DBM value proposition

The DBM value proposition phase marked a transition from initial alignment to the joint articulation of customer-facing value propositions based on servitization and by proposing value through bundling and integrated solutions, as derived in Fig. 1. As shown in Table 5b (Appendix), the cases moved beyond exploratory pilots to develop concrete DBMs through design workshops, iterative prototyping, and feasibility assessments. Empirically, this phase was influenced by the same six governance dynamics introduced earlier, but in co-proposing, technological, strategic, and economic dynamics exerted the strongest impact (Table 5a, Appendix).

Technological dynamics were evident in the way platform providers and manufacturing companies combined digital infrastructures with domain-specific knowledge to co-design DBM offerings. Case I's digital cement optimization services, for instance, were developed in close interaction with Case C's advanced analytics capabilities. As interviewee 4 from Case I explained: *"We bounce ideas and suggestions and pick up wishes from them … we go out to observe on our own and see what we could actually do with software?"* From the perspective of interviewee 2 from Case C, the technological push dimension was equally central: *"Identifying new digital value propositions requires leveraging the latest technologies available from all partners."* These accounts illustrate how technological complementarities were translated into shared value logics, while also exposing tensions in dual orchestration—customers actively co-shaped solutions ("pull"), whereas platform providers sought to stabilize technical architectures and interfaces ("push").

Strategic and economic dynamics were equally prominent. Strategically, co-proposing required alignment on which customer segments and markets to target, as well as the degree of openness versus exclusivity in early solutions. Economically, questions of cost-sharing, revenue expectations, and pricing models surfaced already in these formative phases, creating negotiation arenas where partners sought to balance short-term feasibility with longer-term scalability. These dynamics conditioned how far partners were willing to commit resources to pilots and how value capture was imagined for future scaling.

Relational dynamics were equally significant in this phase, particularly in bridging divergent views on customer needs and data integration. In the Appendix, Table 5b illustrate how partners would navigate relational issues through governance adaption e.g. by mobilizing customer engagement, reciprocal data exchange, and regular feedback sessions to institutionalize the DBM collaboration. Interviewee 5 from Case G pointed to the value of developing different forums for interactions between the DBM actors: *"Engagement with our partners and customers was key. We set up regular workshops and feedback sessions to ensure we were on the right track and addressing real pain points."* In continuation hereof, interviewee 1 from Case F emphasized the engagement with customers: *"We held joint innovation sessions with our customers to co-create solutions that directly addressed their needs."* In addition, interviewee 3 from Case H highlighted the role of data sharing in leveraging joint value propositions: *"By setting up data sharing agreements, we ensured that data could be seamlessly integrated and utilized by all partners*." These practices show how relational mechanisms shifted from one-off pilots to continuous collaboration routines, embedding customers and partners directly into the governance of value proposition design (Table 5b, Appendix).

Governance adaptation underpinned this negotiation process. Joint workshops became arenas for customer-facing prototyping and iterative design. Reciprocal data-sharing agreements moved from protecting proprietary knowledge toward structuring collaborative analytics and validating pilot outcomes. Pilot initiatives shifted from small-scale risk experiments to market-oriented feasibility assessments, where resource commitments and customer adoption potential were tested in parallel. As summarized in Table 5a (Appendix), these evolving governance mechanisms were essential for reconciling differences in priorities and ensuring that co-proposed DBMs remained both customer-relevant and platform-scalable. These findings demonstrate that co-proposing DBM value surfaced relational issues extending beyond technical and strategic negotiation. Several cases underlined that effective collaboration required decentralizing governance to avoid early power asymmetries. Interviewee 2 from Case F explained: *"In the initial phase, we made sure that governance was not centralized. Each partner had a say in the decision-making process, which helped build trust early on."* Interviewee 3 from Case I described the mobilization of dedicated integration teams: *"We established dedicated teams from both companies to work on initial integration tasks, fostering a collaborative spirit from the start."* These governance mechanisms—formal agreements, decentralized decision-making, joint risk assessments, and dedicated teams—were not ancillary but integral to addressing early relational concerns, anchoring collaboration in a balance of contractual safeguards and mutual commitment.

In sum, the co-proposing phase institutionalized early commitments into shared value propositions, conditioned by technological, strategic, and economic dynamics. These propositions reflected not only complementarities between providers and manufacturing companies but also the tensions of dual orchestration, where customer co-shaping (pull) intersected with providers' push for architectural stability. Governance mechanisms—including workshops, data agreements, and feasibility pilots—mediated these tensions, ensuring that DBMs could evolve simultaneously as context-specific solutions and scalable platform offerings. The resulting propositions structured immediate collaborations and prefigured subsequent governance choices, thereby embedding dual orchestration directly into the design of platform-enabled DBMs.

4.3. Digital transformation of platform DBM value co-creation

This phase represented a decisive inflection point in the DBM process, where platform-enabled pilots were converted into embedded offerings. This included among other co-creation of value through customer-centric technology innovation. Unlike earlier phases, digital transformation of value co-creation required deep organizational, technological, and economic adaptation across partners, while navigating interdependency. This phase revealed not only the possibilities of scaling but also the structural asymmetries of dual orchestration, where platform providers pushed for architectural stability and

standardization, while manufacturing companies negotiated fairness in resource allocation and integration pathways (Fig. 2).

Organizational dynamics were particularly salient, as DBM scaling demanded reconfiguration of existing structures, routines, and mindsets. Resistance to change and organizational inertia emerged as recurring relational challenges (as summarized in Table 5b, Appendix). Interviewee 4 from Case F underscored the scale of cultural disruption: "*The biggest challenge is probably the mindset change … making every individual and each business unit across the world understand that digitalization is the disruptor*." To address such inertia, firms mobilized governance mechanisms such as joint project management offices and shared decision-making platforms, which redistributed authority and institutionalized transparency in transformation projects. Interviewee 3 from Case I described this move explicitly: *"Establishing a joint PMO helped in coordinating efforts and maintaining transparency across all project activities."* These mechanisms enabled distributed ownership of digital transformation, preventing one-sided orchestration and embedding duality into governance.

Technological dynamics continued to shape this phase but shifted in emphasis. Rather than focusing on interoperability, the focus turned to embedding digital processes and ensuring cross-partner adoption of shared tools and platforms. Interviewee 1 from Case H highlighted how collective digital infrastructures became indispensable: *"Creating a shared digital workspace where all partners could access and contribute to project data was a game-changer. It ensured everyone was on the same page and helped to drive collective innovation."* Similarly, interviewee 6 from Case G underscored capability building around these infrastructures: *"We implemented extensive training programs to ensure all partners were proficient with the new digital tools and processes."* Governance mechanisms such as cross-partner training programs, shared digital workspaces, and collaborative IT integration routines institutionalized these technological dynamics, translating technical potential into collective capability and ensuring continuity across heterogeneous organizational contexts (Fig. 2).

Economic dynamics gained prominence as resource commitments intensified. Transformation required substantial investment in DBM project infrastructures, while also raising distributive questions of costs, benefits, and risk-sharing. Interviewee 3 from Case H made this concern explicit: *"Investment in (DBM) project infrastructure is critical, but the division of investment and payoff must be fair."* Negotiations of economic fairness became a structural element of dual orchestration, as firms sought assurances that long-term payoffs would match short-term commitments. Governance mechanisms such as transparent reporting structures, shared budgeting within PMOs, and continuous review routines enabled firms to monitor contributions and distribute outcomes more equitably (Table 5a, Appendix).

Governance adaptation was essential in this phase: mechanisms mobilized for alignment and risk mitigation in earlier phases were reconfigured to address organizational inertia, capability asymmetries, and distributive concerns. Joint project management offices evolved into decision-making arenas that institutionalized transparency and redistributed authority. Shared digital workspaces, once tools for data integration, became central infrastructures for collective innovation. Cross-partner training programs expanded from pilot-oriented support to large-scale capability building across firms with uneven digital maturity. Likewise, shared budgeting and review routines shifted from feasibility checks to ensuring equitable allocation of costs and payoffs. These adaptations highlight how governance was dynamically recalibrated to sustain dual orchestration as DBMs transitioned from pilot projects into embedded organizational practices (Table 5a–b; Fig. 2). Taken together, these findings demonstrate that digitally transforming DBM value co-creation was not a technical scaling exercise but a relationally embedded process shaped by organizational, technological, and economic governance dynamics. This phase therefore marked the consolidation of DBMs as collective value-creation architectures, embedding dual orchestration into the operational fabric of both platform providers and manufacturing firms.

4.4. Platform DBM value co-capture & value sharing

The DBM co-capture phase represented the culmination of dual orchestration, where the contested issue of value distribution came to the forefront. Whereas earlier phases emphasized alignment and joint proposition design, co-capture revolved around the negotiation of revenue models, rights, and responsibilities. In the phase, governance and innovative revenue models for co-capturing and sharing value were explored, as derived in Fig. 1. Initial transactional arrangements were progressively replaced by recurring revenue structures that had to be calibrated across heterogeneous markets and industries, and were particularly influenced by economic, strategic and regulative dynamics (Table 5a, Appendix).

Economic dynamics were particularly salient in this phase. Scaling DBMs required recurring revenue streams that could reconcile providers' ambitions for standardization with manufacturers' demands for sector-specific adjustment and fairness. This shift was not abstract but materialized in experimentation with new pricing logics, as explored further in 4.4.1. Such examples underscore how the search for sustainable revenue models became inseparable from the governance of fairness, transforming value capture into an arena where dual orchestration was embedded directly into the revenue logic.

Strategic and regulatory dynamics reinforced this negotiation process. Strategically, revenue models shaped long-term commitment, since inequitable distribution could undermine collaboration and stall scaling. Regulatory dynamics, particularly around liability, data protection, and competition law, surfaced sharply once revenues depended on sensitive customer data and recurring contractual obligations. Firms therefore had to embed safeguards for compliance and liability sharing, while ensuring that sector-specific norms were respected.

Relational dynamics were equally significant. As shown in Table 5b (Appendix), fairness, reciprocity, and trust were recurrent concerns during co-capture. Interviewee 2 from Case F highlighted the importance of recalibration of revenue-sharing mechanisms, which were "*regularly reassessed to maintain alignment.*" Interviewee 2 from Case I emphasized the importance of "*continuous feedback and adaptation*" to ensure governance flexibility in adjusting to emerging industry conditions influencing the value capture Together, these practices illustrate how governance in co-capture is sustained through mechanisms of monitoring, adjustment, and renegotiation, embedding flexibility as an institutionalized outcome rather than a one-off arrangement.

Governance adaptation was critical: mechanisms mobilized for coordination and pilot feasibility were recalibrated to manage distributive tensions and prevent opportunism. E.g. joint dashboards and financial performance reviews institutionalized transparency, ensuring that contributions and outcomes could be monitored by all partners. Periodic renegotiations, often quarterly or biannually, allowed agreements to adapt to adoption rates, service reliability, and shifting market or regulatory demands (Table 8, Appendix). In this way, governance adaptation became a balancing device—enabling partners to sustain collaboration despite asymmetries in data control, investment, and revenue exposure.

In sum, co-capture revealed the most visible asymmetries of dual orchestration. Platform providers sought standardized, scalable revenue logics (push), while manufacturers negotiated sectoral adjustments and guarantees of fairness (pull). Importantly, co-capture was not a terminal point but a dynamic governance arena, requiring constant recalibration of value distribution in response to evolving technological, regulatory, and market conditions (Tables 5a–b; Fig. 2).

4.4.1. Revenue models and dual orchestration in value Co-capture

The negotiation of revenue models crystallized the tensions of dual orchestration most visibly, with different logics surfacing across subscription-based, pay-per-use, and outcome-oriented designs. In

subscription-based arrangements, scalability and standardization were promoted primarily by platform providers, who sought to stabilize predictable revenue streams. The shift required manufacturing partners to adapt pricing and customer communication to industry-specific cycles, prompting recurring negotiations of subscription terms. Governance adaptation was central here: dashboards and quarterly review meetings institutionalized transparency, allowing both sides to evaluate churn, renewal rates, and adoption metrics before committing further investments. Pay-per-use models surfaced where industrial contexts made recurring fees less viable, but they carried their own governance challenges. Interviewee 3 from Case D highlighted how usage-based arrangements required new forms of monitoring to verify consumption and ensure fairness: *"We had to create new revenue models to co-capture value, which is a challenging task, but a necessary part of capturing value across the platform partnerships."* Here, governance adaptation involved embedding digital metering and usage-tracking infrastructures directly into the DBM, coupled with joint financial performance reviews. By making operational data visible to all parties, these mechanisms reduced disputes over utilization but simultaneously heightened sensitivity to liability and cybersecurity concerns.

Outcome-based pricing introduced the most complex form of orchestration, as payments hinged on agreed performance indicators and uncertain returns. Interviewee 2 from Case G exemplified this trajectory, moving deliberately away from transactional sales: "*We're moving from a transaction-based model to a recurring business model. Typically, right now we are testing different types of subscriptions.*" And several managers noted that revenue-sharing mechanisms were regularly reassessed to maintain alignment. Unlike subscriptions or pay-per-use, outcome-based pricing required intensive trust-building, since failures or underperformance could not be fully mitigated ex-ante.

Governance adaptation thus relied on flexible contractual clauses, periodic renegotiations, and shared analytics platforms that allowed performance data to be scrutinized collectively. The relational issue here was not only fairness but also the credibility of metrics, as partners debated which outcomes counted as legitimate bases for compensation. Across these three revenue logics, dual orchestration was visible in the interplay between providers' push for scalable architectures and manufacturers' pull for sector-sensitive adaptations. Governance mechanisms were not ancillary but constitutive of this balance: dashboards, financial reviews, renegotiation cycles, and performance-tracking infrastructures institutionalized collaboration. In this sense, revenue models were not merely instruments of value capture but arenas where the durability of trust, fairness, and legitimacy in platform DBMs was repeatedly tested and renegotiated.

4.5. Dual orchestration across cases

We use the term *dual orchestration* to denote the dynamic co-governance logic we witnessed across the cases of the industrial platform collaborations and in which platform providers and manufacturing firms jointly assume and adapt orchestration roles across DBM phases. Rather than a fixed orchestrator–complementor split, decision rights and coordination authority reallocate between partners as collaborations iterate through initiation, co-proposing, digital transformation, and co-capture. These shifts appeared to be stabilized by relational mechanisms—transparency, reciprocity, commitment, proximity, and coopetition—and enacted through governance routines (e.g., joint PMOs, reciprocal data protocols, open-book reviews). An example of dual orchestration is Case A-H: At initiation, the platform provider (Case A) sets interoperability/security baselines while the manufacturer (Case H) secures reciprocal data access; during co-proposition/transformation, the manufacturer leads customer pilots and scoping as the provider institutionalizes a joint PMO and shared workspaces; at co-capture, the provider pushes standardized subscription logics and instruments joint dashboards with quarterly reviews, while the manufacturer negotiates sector-specific pricing, liability, and compliance.

The cross-case comparison (Table 7, Appendix) demonstrates firm role transitions in the DBM process. The role transitions were influenced by mechanisms established in early phases creating governance resources that shaped later negotiations. Interviewee 2 from Case F illustrated this path-dependency: *"Because we had built trust early, we could later negotiate revenue sharing without fearing opportunism."* Also, authority over roadmaps and commercialization logics likewise shifted over time, as described by interviewee 3 from Case D: *"Initially, the platform owner dictated the roadmap, but over time we pushed to get influence on what features mattered for our customers."* This redistribution demonstrates that dual orchestration is about iterative recalibration, where initial asymmetries can be rebalanced through cumulative bargaining and capability alignment. Customers also figured prominently across phases, not as passive adopters but as co-orchestrators. In co-proposing, they engaged in workshops and feedback loops (Cases I, G, F); and during commercialization, they retained discretion to configure analytics and services as modular add-ons rather than fixed bundles. This discretion illustrates how dual orchestration extended to customer choice architecture, balancing configurability (customer pull) against economies of scale (provider push). Beyond dyads, orchestration also unfolded at the portfolio level, with customers acting as co-orchestrators by shaping selection, modular configuration, and adoption thresholds, thereby rebalancing authority across phases.

Sustaining collaboration across phases required the institutionalization of governance adaptation. Mechanisms such as joint dashboards, monitoring systems, and renegotiation cycles translated relational goodwill into operational practice. Thus, transparency, reciprocity, commitment, proximity, and coopetition (Table 8, Appendix) were not abstract conditions but became embedded in financial reviews, joint project management offices, open-book reporting, co-located training, and even coopetitive service development. Importantly, orchestration unfolded under portfolio conditions rather than dyadic exclusivity. Below Table 1 shows how firms like Case F simultaneously acted as both a platform provider and manufacturing complementor, while providers such as Case A or Case C engaged multiple industrial partners across sectors. This multiplicity reinforced the need for governance routines and emerged as a generalizable capability for managing distributed portfolios of platform DBMs.

Taken together, these findings highlight dual orchestration as a defining characteristic of industrial platform DBMs. Rather than a one-off negotiation of roles, it is an evolving, multi-directional process sustained by cumulative governance adaptation and relational embedding. Figs. 1 and 2 integrate these trajectories, conceptualizing dual orchestration as a recursive process of alignment, transformation, and redistribution that underpins the durability of industrial platform DBMs. To make these cross-case patterns visible, Table 1 systematizes the empirical manifestations of dual orchestration across provider–manufacturer constellations. It maps concrete DBM configurations alongside the governance mechanisms and relational practices that redistributed authority in each collaboration, thereby evidencing the portfolio (not dyadic) nature of industrial DBMs.

Building on Table 2 (Appendix) and informed by the empirical constellations in Table 1, Fig. 1 below summarizes the process of dual orchestration across four phases of DBM development. Each phase is characterized by specific managerial activities, which are influenced by distinct governance dynamics. In Phase 1 (Initiation), goal alignment and business model complementarities are shaped by strategic, technological, and risk-related governance dynamics. In Phase 2 (Co-proposition), servitization, bundling, and integration are negotiated under technological, strategic, and economic dynamics. In Phase 3 (Digital transformation), organizational, technological, and economic dynamics guide the embedding of infrastructures, development of customer-centric solutions, and reconfiguration of practices to manage interdependencies. In Phase 4 (Co-capture), innovative revenue and governance models are negotiated under economic, regulatory, and risk dynamics. The process is iterative rather than linear, as indicated by the

bidirectional arrows between phases, showing how outcomes from one phase can re-enter and reshape earlier negotiations. At the center, dual orchestration is conceptualized as role adaptation shaped by relational mechanisms of transparency, reciprocity, commitment, proximity, and coopetition. Read this way, Fig. 1 depicts dual orchestration as a recursive process logic—with identifiable gate conditions, feedback loops, and role reallocation—rather than a linear sequence of activities.

The figure illustrates how managerial actions unfold across four DBM phases, how governance dynamics and relational mechanisms (transparency, reciprocity, commitment, proximity, and coopetition) enable and shape dual orchestration through joint role adaptation.

Fig. 2 specifies the governance architecture that sustains dual orchestration across DBM phases. It depicts how governance dynamics (technological, economic, strategic, organizational, and regulatory) give rise to relational issues such as alignment, expectation management, and resistance to change. These in turn shape the governance mechanisms—ranging from formal agreements and revenue-sharing models to joint project organizations, shared digital workspaces, and continuous feedback structures—that stabilize collaboration and redistribute authority. Together, these layers show how decision rights and value capture shift as collaborations evolve from initiation to transformation and co-capture. Read alongside the Platform DBM Process Model (Fig. 1), Fig. 2 clarifies how dual orchestration is enacted through the interplay of governance dynamics, relational issues, and mechanisms across phases. Table 8 (Appendix) provides cross-case illustrations of how these mechanisms operated in practice.

The figure illustrates how dual orchestration structures the governance of industrial platform DBMs across the DBM phases, integrating governance dynamics and navigating relational issues through specific governance mechanisms and dual orchestration centered around key relational mechanisms (transparency, reciprocity, commitment, proximity, coopetition).

5. Discussion

This study investigates how B2B manufacturing firms and platform providers co-create and co-capture value in industrial digital platforms. Building on the four-phase DBM framework (Initiation, Co-Proposing, Digital Transformation, and Value Co-Capture) and the governance dynamics (technological, strategic, economic, organizational, risk-related, and regulatory) outlined in Fig. 1 and 2, we show how DBMs in manufacturing industries evolve through iterative, trust-dependent governance adaptation. The paper responds directly to recent calls in *Technovation* and the Special Issue on "*Digitalization, platforms and ecosystems in manufacturing*" to clarify how industrial firms engage in digital platform ecosystems and how governance mechanisms shape manufacturing transformation. Our findings extend prior research that has predominantly focused on B2C platforms (e.g., Adner, 2022; Cennamo, 2019) or linear servitization trajectories (Kohtamäki et al., 2019; Paschou et al., 2020) by demonstrating that value creation in manufacturing platforms follows an iterative, multi-actor process in which governance logics and relational mechanisms shift across phases. The cross-case analysis shows that while industrial firms differ in industry-specific governance responses, the dynamics of dual orchestration and adaptive governance remain consistent. Industrial platform ecosystems cannot be understood through static models of servitization or binary governance (centralized vs. decentralized). Instead, they require recognition of the dynamic interplay of governance, trust, and value capture in manufacturing-specific ecosystems, where regulatory constraints, technological integration, and sectoral risks play a decisive role.

5.1. Driving DBM value Co-creation in B2B industrial platforms

The co-creation of value in DBMs has often been conceptualized as a linear or staged process linked to servitization pathways (Kohtamäki et al., 2019; Paschou et al., 2020). However, our findings demonstrate that in industrial platform contexts (B2B), DBM value co-creation is fundamentally iterative, requiring adaptive alignment between platform providers and industrial firms across multiple dimensions. In contrast to consumer platforms (B2C), where value creation primarily derives from network effects and user scalability (Cennamo, 2019; Adner, 2022), manufacturing DBMs hinge on overcoming sector-specific frictions: integration with legacy systems, risk exposure, regulatory compliance, and the coordination of multi-tier supply chains. In the Initiation phase, the DBM collaboration is strongly shaped by strategic alignment around customer problem definition. Our cases illustrate how mismatched expectations between platform providers and manufacturers frequently delay DBM formation — a challenge underexplored in existing platform literature, which often assumes predefined adoption paths (Cusumano et al., 2015; Täuscher and Laudien, 2018). For example, Case I needed to align emissions-related platform design with evolving environmental regulations, whereas Case F and Case G struggled with aligning modular digital solutions to legacy manufacturing infrastructures. These cases reveal that these governance dynamics - particularly strategic, regulatory, and technological - directly structure the early governance of manufacturing DBMs.

During the Platform DBM Proposition phase, value co-creation intensifies as manufacturers and platform providers co-develop architecture and governance rules. While prior work emphasizes platform openness and complementarities (Cennamo, 2019; Jovanovic et al., 2022), our findings show that in manufacturing ecosystems, barriers arise from stringent data-sharing constraints, divergent customer engagement practices, and ecosystem complexity. Case A and Case E, for instance, established highly formalized interoperability agreements and feedback loops with industrial partners to mitigate such frictions. The Digital Transformation phase further underlines the manufacturing-specificity of DBM co-creation. Prior research stresses modularity as a driver of ecosystem scalability (Gawer and Cusumano, 2014), but our cases reveal that the decisive challenge lies in aligning organizational structures and work practices with platform logics. Case F encountered resistance when integrating industrial IoT into established production processes, requiring joint reskilling and co-investment initiatives. Our findings complement Veile et al. (2022) by showing the organizational embeddedness of digital platform adoption in manufacturing. Finally, in the Platform DBM Value Co-Capture phase, DBM sustainability depends not only on monetization but also on regulatory alignment and trust-based governance. Unlike prior literature that assumes standardized monetization models (Täuscher and Laudien, 2018; Masucci et al., 2020), our findings show that industrial firms must develop adaptive, context-specific revenue-sharing agreements shaped by compliance demands and long-term risk-sharing. The case of Case J, for example, highlights how regulatory oversight in pharmaceuticals drives compliance-driven revenue models, contrasting with the hybrid and performance-based approaches used by Case F, Case G, and Case I.

5.2. Industrial platforms as dynamic arenas of dual orchestration

Recent research on industrial digital platforms has emphasized their role as enablers of digital servitization and ecosystem innovation (Kohtamäki et al., 2019, 2024; Essen et al., 2023; Dalenogare et al., 2023). However, most of this work still portrays orchestration in relatively static terms, where the platform provider sets governance rules and manufacturers adapt accordingly. Our findings challenge this view by showing that dual orchestration is constitutive of B2B industrial platforms: decision rights and governance practices shift repeatedly across DBM phases, shaped by the contingencies of manufacturing contexts. In the initiation phase, formal safeguards such as NDAs, IP rights agreements, and data-use restrictions established initial boundaries (Gawer, 2021). Similar to what Kohtamäki et al. (2019) describe in their work on digital servitization ecosystems, trust and relational alignment proved crucial for bridging asymmetries between platform providers' technological capabilities and manufacturers' domain

knowledge. Our findings complement Dalenogare et al. (2023), by revealing that social exchange mechanisms are as central as contractual governance in building viable digital servitization ecosystems.

During the DBM value proposition phase, B2C ecosystems often rely on rapid modular experimentation and immediate consumer feedback, whereas B2B manufacturing contexts require slower, co-designed processes shaped by regulatory scrutiny, capital intensity, and deep customer integration. Our evidence extends this line of inquiry by demonstrating how data-sharing protocols and co-defined value propositions become sites of negotiation in industrial DBMs, requiring governance mechanisms that balance innovation speed with risk exposure. In the transformation phase, governance shifted to operational embedding. Prior studies emphasized architectural control as the main lever (Wareham et al., 2014), but in B2B manufacturing, orchestration took the form of joint project organizations, shared PMOs, and training structures distributing authority across partners. This extends Kohtamäki et al. (2024) by showing that servitization ecosystems require not only technological integration but also organizational co-adaptation. Finally, in the co-capture phase, our cases revealed revenue-sharing and performance-based models that were continuously monitored and renegotiated, echoing findings by Dalenogare et al. (2023) on adaptive financial governance in digital servitization ecosystems. Taken together, these insights show that industrial platforms cannot be understood through static orchestrator–complementor models. Instead, they function as dynamic arenas of dual orchestration, where authority and responsibility continuously shift between platform providers and manufacturers. By foregrounding the B2B manufacturing context, our study extends *Technovation's* ongoing debate on digital servitization and ecosystem innovation (Hou and Shi, 2021; Bustinza et al., 2022; Kapoor et al., 2022), demonstrating that governance is neither unilateral nor stable but enacted through ongoing relational negotiation across DBM phases.

5.3. Innovation trajectories in industrial platforms

A central insight from our study is that innovation in industrial digital platforms develops through recursive and path-dependent trajectories rather than linear, one-off processes. In contrast to B2C settings, where innovation trajectories are theorized in terms of rapid adoption and scalable network effects (Adner, 2022; Cennamo, 2019), our findings show that B2B manufacturing requires slower, negotiated pathways of innovation. These are conditioned by dual orchestration, where platform providers and manufacturers alternately drive technological, organizational, and regulatory adaptation. This perspective advances debates in *Technovation* on digital servitization and industrial platforms (Kohtamäki et al., 2019, 2024; Tian et al., 2022; Dalenogare et al., 2023). Kohtamäki et al. (2024) conceptualize digital servitization ecosystems as multi-actor systems enabling service-based innovation, while Dalenogare et al. (2023) emphasize collaboration types and social exchange mechanisms. Our findings extend this work: in manufacturing ecosystems, innovation is not an outcome of predefined governance models but emerges from recursive adjustments across DBM phases. Early co-definition of problem framings and data-sharing arrangements anchors subsequent innovation, constraining and enabling new opportunities.

Empirically, industrial firms integrate platform innovation into existing structures while redefining them. Case F faced resistance integrating industrial IoT into production, necessitating joint reskilling and shared investments. This echoes Veile et al. (2022), who argue that adoption depends on organizational embeddedness more than technological features. Case G and Case I leveraged reference projects — predictive maintenance and cement optimization — as path-shaping mechanisms for later innovation, confirming that early relational credibility and governance practices have durable effects.

Framing these dynamics as recursive responds to the Technovation call on "*Digitalization, platforms and ecosystems in manufacturing*." The cases demonstrate that innovation trajectories are neither purely provider- nor manufacturer-driven. Instead, they evolve through dual orchestration where control, authority, and credibility shift with regulatory demands, technological interdependencies, and customer adoption. For example, while Case A or Case E initially orchestrated interoperability standards, manufacturers retained authority over customer access and domain legitimacy — producing co-dependent rather than unilateral pathways. Innovation in industrial digital business models (DBMs) should thus be conceptualized as a dual process, encompassing both technological advancement and the relational reconfiguration of interfirm collaboration. Governance arrangements such as performance-based contracts or joint project management offices not only mitigate risks but also structure innovation direction. Thus, our study extends Cennamo's (2019) theorization of platform governance by emphasizing the recursive and negotiated character of innovation in B2B manufacturing. Rather than predetermined by architectural choices, trajectories unfold through renegotiation across phases, where trust, regulation, and sectoral risks co-shape outcomes.

5.4. Governance and dual orchestration in industrial platforms

Before turning to the broader implications of governance, it is important to specify how dual orchestration is enacted in practice. Our cross-case synthesis highlights five relational mechanisms—transparency, reciprocity, commitment, proximity, and coopetition—that enable role adaptation across DBM phases. These mechanisms provide the socio-relational scaffolding through which governance authority can shift without destabilizing collaboration. Transparency minimizes asymmetries, reciprocity ensures fairness, commitment anchors long-term orientation, proximity sustains alignment, and coopetition balances rivalry and collaboration. Together, these mechanisms operationalize dual orchestration as a hybrid governance form in which structural and relational dimensions are mutually constitutive, as illustrated in the cross-case analysis of the platform-collaboration dynamics (Table 8, Appendix). Our findings position dual orchestration as a defining governance logic in industrial digital platforms. Unlike B2C ecosystems, where platform providers dominate governance through unilateral control of standards, interfaces, and user access (Cennamo, 2019), industrial platforms in manufacturing contexts require a continuous redistribution of governance authority between platform providers and manufacturing firms. Shifts occur across phases depending on technical interdependencies, regulation, and customer adoption. This contributes to ongoing *Technovation* debates on governance in digital servitization and industrial ecosystems. Essen et al. (2023) emphasize that manufacturing firms increasingly rely on digital platforms to orchestrate service innovation, yet our study shows that these firms are not merely complementors. Instead, they co-orchestrate governance by mobilizing domain knowledge, customer legitimacy, and sectoral credibility—particularly salient in regulated and capital-intensive industries such as cement and energy.

Dalenogare et al. (2023) identify inter-firm collaboration types and social exchange mechanisms as central to ecosystem building. Our evidence extends their findings by showing that governance mechanisms such as joint project management offices, shared data protocols, and adaptive revenue-sharing models not only stabilize collaboration, but also channel innovation trajectories, institutionalizing dual orchestration over time. By foregrounding the manufacturing context, we demonstrate that governance is not a one-off design choice, but an ongoing, relational process contingent on sector-specific challenges. This reinforces Kohtamäki et al.'s (2024) argument that governance and relational mechanisms are co-dependent in digital servitization ecosystems, while extending it by showing how trust dynamically underpins dual orchestration across DBM phases.

Taken together, these insights shift the focus from unilateral platform governance to a recursive and relational view of dual orchestration. Authority in industrial platforms is continuously recalibrated between platform providers and manufacturers in line with

technological interdependencies, regulatory pressures, and customer adoption cycles. In doing so, our study extends *Technovation*'s research on industrial platforms (e.g., Jovanovic et al., 2022; Fu et al., 2023; Dalenogare et al., 2023; Essen et al., 2023; Kohtamäki et al., 2024), offering a governance perspective embedded in the realities of manufacturing ecosystems and aligned with the special issue's emphasis on industrial digital platforms and ecosystems.

6. Conclusion

This study demonstrates how B2B manufacturing firms and platform providers iteratively develop and refine digital business models (DBMs) through industrial digital platforms. Rather than a linear design–deployment process, DBM innovation unfolds as a dually orchestrated journey shaped by shifting governance authority, evolving relational issues, and continuous recalibration of value creation and capture. The Platform DBM Process Model (Fig. 1) identifies the managerial activities and governance dynamics through which value is co-created and co-captured, while the Dual Orchestration Governance Framework (Fig. 2) shows how relational mechanisms stabilize collaboration and redistribute roles across phases.

Our findings challenge the assumption of centralized platform governance (Cusumano et al., 2019), revealing instead a logic of dual orchestration in which authority shifts between providers and manufacturers depending on technical interdependencies, regulation, and customer legitimacy. This extends platform research beyond consumer ecosystems (Cennamo, 2019) by showing how industrial platforms require adaptive, distributed governance arrangements (Thomas and Ritala, 2022). Trust emerges here not as a precondition but as an evolving governance mechanism built through transparency, performance alignment, and iterative coordination (Kapoor, 2018; Gawer, 2021).

Taken together, these insights position dual orchestration as a defining governance logic for industrial DBMs and advance debates on platform governance, servitization, and ecosystem-level business model innovation. They also directly address the Special Issue's call by showing how manufacturing firms and platform providers jointly shape governance, value creation, and digital transformation in industrial ecosystems.

6.1. Theoretical contributions

This study advances research on digital business models (DBMs), industrial digital platforms, and governance through four interrelated theoretical contributions.

First, we theorize dual orchestration as the defining governance logic in industrial B2B platforms. Prior research has often conceptualized orchestration as a platform-provider–dominated function, particularly in consumer ecosystems where providers retain unilateral control over standards, interfaces, and access (Gawer and Cusumano, 2014; Jacobides et al., 2018; Cennamo, 2019). Our findings challenge this view by showing that in industrial platforms, orchestration authority is continuously redistributed across DBM phases. Manufacturing firms mobilize regulatory legitimacy, domain expertise, and customer access to steer initiation and co-proposing, while platform providers assume stronger roles in digital transformation and scaling. This duality challenges hierarchical models and extends recent insights on shared leadership and co-orchestration in B2B contexts (Wei et al., 2019; Jovanovic et al., 2022). The Dual Orchestration Governance Framework (Fig. 2) consolidates this contribution by mapping how authority shifts recursively over time and how role adaptation is sustained through relational and governance mechanisms.

Second, we advance theorization of platform governance by conceptualizing adaptive governance as a relationally enacted, iterative process. Governance in industrial DBMs does not emerge as a stable architecture but evolves through phase-contingent mechanisms that stabilize collaboration while channeling innovation trajectories. Our study shows how governance mechanisms shift from contractual safeguards in initiation to joint project management offices and reciprocal data-sharing protocols in co-proposing, to shared dashboards, PMOs, and adaptive revenue-sharing in transformation and co-capture. This progression illustrates that governance authority is not predefined but relationally negotiated in practice, extending prior models of stable or provider-dominated governance (Eloranta and Turunen, 2016; Thomas and Ritala, 2022; Kretschmer et al., 2022). Relational mechanisms such as transparency, reciprocity, proximity, commitment, and coopetition operationalize these shifts, converting goodwill into governable routines. The Dual Orchestration Governance Framework (Fig. 2) demonstrates how these structural and relational dimensions intertwine across phases, offering a dynamic and transferable model of adaptive governance for industrial ecosystems.

Third, we reconceptualize DBM evolution in industrial contexts as a recursive, ecosystem-level process rather than a linear migration from products to services. Prior research has emphasized servitization and product–service bundling as the primary pathways for business model transformation (Visnjic et al., 2018; Kohtamäki et al., 2024; Tian et al., 2022). Our evidence demonstrates that DBMs in industrial platforms unfold as iterative recombination processes shaped by technical interdependencies, customer adoption dynamics, and regulatory contingencies. The Platform DBM Process Model (Fig. 1) captures this recursive logic, showing how managerial actions and governance dynamics reconfigure collaboration across four interconnected phases. This reframing extends recent work on industrial servitization ecosystems (Kohtamäki et al., 2019, 2024; Dalenogare et al., 2023) by theorizing DBM evolution not as firm-centric migration but as ecosystem-level path formation through platform-enabled recombination.

Fourth, we extend debates on innovation trajectories in industrial platforms by demonstrating their path-dependent and governance-contingent character. Unlike consumer platforms, where innovation trajectories are theorized in terms of rapid scaling and network effects (Cennamo, 2019; Adner, 2022), our study shows that in manufacturing, innovation is cumulative and shaped by early governance choices. Initial alignments around problem definition, interoperability, and data-sharing act as governance capital that conditions later phases of digital transformation and value co-capture. This insight complements prior research on recursive experimentation in digital servitization (Dalenogare et al., 2023) by showing how relational credibility and governance adaptation create enduring reference points that structure long-term innovation direction. By linking governance dynamics to innovation trajectories, we extend theorization of how industrial DBMs evolve as co-produced, recursive outcomes of governance adaptation, rather than predetermined designs.

Taken together, these contributions position dual orchestration as a central governance logic in industrial DBMs, demonstrate how adaptive governance is relationally enacted across phases, reconceptualize DBM evolution as recursive and ecosystemic, and clarify how innovation trajectories are path-dependent outcomes of early governance and relational choices. Figs. 1 and 2 provide empirically grounded frameworks that integrate these insights, offering a robust theoretical foundation for advancing debates on industrial digital platforms, servitization, and platform-based business model innovation.

6.1.1. Contributions to the special issue on digital B2B platforms for manufacturing

Our study contributes to the Special Issue by addressing the three focal themes of governance, transformation, and sectoral conditions in industrial digital ecosystems. First, we show how platform-based DBM development is conditioned by regulatory exposure, capital intensity, and domain-specific expertise, demonstrating that governance adaptation is inseparable from industry-specific constraints (Nambisan et al., 2019; Sjödin et al., 2022; Ghosh et al., 2022). Second, we trace the innovations required for transformation by conceptualizing DBM evolution as a recursive, phase-based process, captured in the Platform DBM Process Model (Fig. 1), which explains how technical interdependencies,

customer adoption, and regulatory contingencies reshape managerial action across phases. Third, we theorize dual orchestration as the defining governance logic of industrial platforms, showing how authority shifts between providers and manufacturers across DBM phases. The Dual Orchestration Governance Framework (Fig. 2) consolidates this insight by linking governance dynamics with relational mechanisms that stabilize collaboration and redistribute authority over time, extending research on industrial servitization and ecosystem governance (Bustinza et al., 2022; Tian et al., 2022; Kapoor et al., 2022; Fu et al., 2023). Together, these insights answer the Special Issue's call by demonstrating how sector-specific conditions, recursive innovation pathways, and dynamic role reconfigurations jointly shape the digital transformation of manufacturing ecosystems.

6.2. Managerial implications

Managers in manufacturing platforms must recognize that governance in B2B ecosystems is neither static nor unilateral. Authority and responsibility shift repeatedly between providers and manufacturers, requiring adaptive rather than fixed arrangements. First, governance structures should be designed for flexibility: joint project offices, iterative alignment meetings, and adjustable data-sharing protocols allow responsibilities to be recalibrated as interdependencies evolve. Second, trust must be institutionalized through transparent revenue-sharing formulas, reciprocal risk-sharing, and open communication on data use. Embedding fairness and transparency into formal structures provides credibility that later enables joint value capture. Third, revenue models should be treated as provisional and adaptive. Outcome-based pricing, subscription hybrids, or performance-linked contracts require continuous experimentation and renegotiation to sustain incentives as adoption scales. Finally, managers should view dual orchestration as a leadership responsibility. Rather than assuming stable roles, firms must anticipate phases in which they lead and others in which they follow. Developing relational capabilities—negotiation, joint sensemaking, conflict resolution—becomes central to maintaining ecosystem stability and securing long-term value.

6.3. Limitations and future research

This study concentrated on leading industrial firms in mature markets, limiting generalizability to less mature ecosystems or firms without established DBM capabilities. Future research should examine how dual orchestration unfolds in such contexts, where governance, trust-building, and revenue-sharing may take different forms. Second, our cases traced governance dynamics across DBM phases but not over extended time horizons. Longitudinal studies could clarify whether governance authority stabilizes, fragments, or remains recursive as platforms scale. Third, the cases primarily involved industrial IoT and cloud-based platforms. Emerging technologies such as artificial intelligence, blockchain, and edge computing may reconfigure authority, automate trust mechanisms, and alter revenue logics in new ways. Finally, it remains uncertain whether dual orchestration represents a transitional condition or a stable equilibrium. Comparative studies across industries and geographies could assess whether industrial DBMs ultimately converge toward centralized platform control or distributed governance.

CRediT authorship contribution statement

Annabeth Aagaard: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Validation, Visualization, Writing – original draft, Writing – review & editing. **Wim Vanhaverbeke:** Conceptualization, Supervision. **Oliver Gassmann:** Conceptualization, Data curation.

Ethics statement

Ethic statement -Not applicable.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

APPENDIX

Table 2
Mapping the Four DBM phases and their Key Activities and Managerial Actions.

DBM Phase	Key activities	Supporting Quotes	Managerial actions
Initiation of Platform DBM	This phase involves the initiation of collaboration between platform providers and manufacturing companies. Key activities include aligning goals, identifying complementary business models, and formalizing governance structures through legal agreements.	*"You have an initiation phase where you need to align your strategies and ensure that both partners are on the same page regarding the objectives of the collaboration." – Case D, Interviewee 1* *"We need a complementary business model. We've tried partnerships before where conflicting business models led to failure. Complementarity is crucial." – Case I, Interviewee 4* *Both companies protect their IP and legal rights through various mechanisms … to ensure that knowledge-sharing remains beneficial without jeopardizing proprietary innovations." – Case H, Interviewee 2*	Strategic alignment at the start of the DBM process is carried out through various formal and informal meetings and interactions. Complementary business models ensure that the partners' business models do not conflict but rather support each other. Legal agreements and intellectual property (IP) considerations are the essential early steps to formalize the collaboration and build trust.
Platform DBM Value Proposition	In this phase, partners collaborate to identify and propose a joint value proposition that leverages their combined capabilities. This involves deep engagement with potential customer problems and exploring new servitization opportunities.	*"We propose value by bundling our hardware with the digital capabilities provided by the platform provider, focusing on specific customer problems." – Case C, Interviewee 3* *"We engage customers directly to understand their pain points. This interaction helps in shaping a value proposition that is customer-centric." - Case I, Interviewee 1*	Value bundling and addressing specific customer issues through combined offerings are in focus. Direct customer engagement is applied to ensure that the value proposition is grounded in real customer needs. Digital technology exploration and exploitation is balanced accordingly to leverage the value proposition.

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Table 2 (*continued*)

DBM Phase	Key activities	Supporting Quotes	Managerial actions
		"Technology exploration and exploitation are balanced to ensure we propose value that is both innovative and feasible." – Case G, Interviewee 5	
Digital Transformation of DBM Value Co-Creation	This phase involves the actual transformation of the partners' organizations to co-create the proposed value. It includes significant changes in organizational processes, structures, and cultures to integrate digital capabilities effectively.	*"The biggest challenge is the mindset change. Every business unit must understand the disruptive potential of digitalization." – Case F, Interviewee 4* *"Investing in joint project infrastructure is crucial. We often establish a dedicated project organization to drive this transformation." – Case C, Interviewee 1* *"We see value creation in operating our products better and sharing value directly with the end-user during operation." – Case H, Interviewee 1*	Organizational change and mindset shift are critical challenges addressed by management's direct actions in shaping the organization around the DBM. Establishing a joint project infrastructure facilitates the collaborative efforts needed for value co-creation. The case companies shift towards operational efficiency and value sharing with end-users as a key focus.
Platform DBM Value Co-Capture & Sharing	The final phase involves innovating new revenue models and value-sharing mechanisms to co-capture and distribute the value co-created through the DBM. It requires ongoing evaluation and adaptation to ensure sustainable value capture.	*"Ensuring fair value capture for all stakeholders is challenging. We need governance mechanisms to monitor and address scaling challenges." - Case D, Interviewee 2* *"We're moving from transaction-based models to subscription-based models …. which offer more stable and recurring revenue streams." - Case G, Interviewee 1* *"Continuous trust-building is critical. Trust evolves through transparency and showing vulnerabilities throughout the process." – Case E, Interviewee 2*	Different governance mechanisms are installed for fair value capture, ensuring that all stakeholders benefit equitably. Many of the DBM cases explore and transition to subscription-based revenue models, which reflects the shift towards recurring revenue streams. Continuous trust-building activities are established to ensure the longevity of the DBM collaboration.

Table 3
Comparative Overview of Platform Governance Models Across Ecosystem Types

Feature	B2C Platforms (Cusumano et al., 2015; Cennamo, 2019)	Joint Ventures (Luo, 2002; Hennart and Zeng, 2005; Han et al., 2022)	Industrial B2B Platforms (Our findings)
Governance Structure	Centralized, platform provider dictates rules and policies, with competitive or open innovation ecosystems	Bilateral contractual agreements with predefined governance structures, formalized long-term engagements	Dual orchestration with evolving governance mechanisms based on strategic alignment and role reconfigurations, iterative co-creation, and high interoperability often facilitated by industry consortia
Power Distribution	Dominant orchestrator (platform owner), hierarchical control; platform provider assumes most risks	Shared control between joint venture partners, equity-based; shared risk allocation based on financial commitments	Dynamic power balance between platform providers and manufacturing firms, adjusted through governance mechanisms; risk continuously reallocated through governance adjustments
Value Capture Mechanisms	Revenue from transaction fees, subscriptions, and advertising	Profit-sharing agreements, fixed investment returns	Hybrid models: data monetization, usage-based fees, outcome-driven value-sharing
Role Fluidity	Static roles—platform provider as orchestrator, complementors as value providers	Fixed contractual obligations, limited role evolution	Fluid role transitions between orchestrator and complementor, negotiated iteratively
Trust Mechanisms	Standardized platform policies and user ratings	Relational trust, equity ownership, legal safeguards	Algorithmic transparency, regulatory compliance, structured governance adaptation
Risk Allocation	Platform provider assumes most risks; complementors follow platform rules	Shared risk allocation based on financial commitments and equity structure	Risk is continuously reallocated through governance adjustments, mutual adaptation to market and technological uncertainties

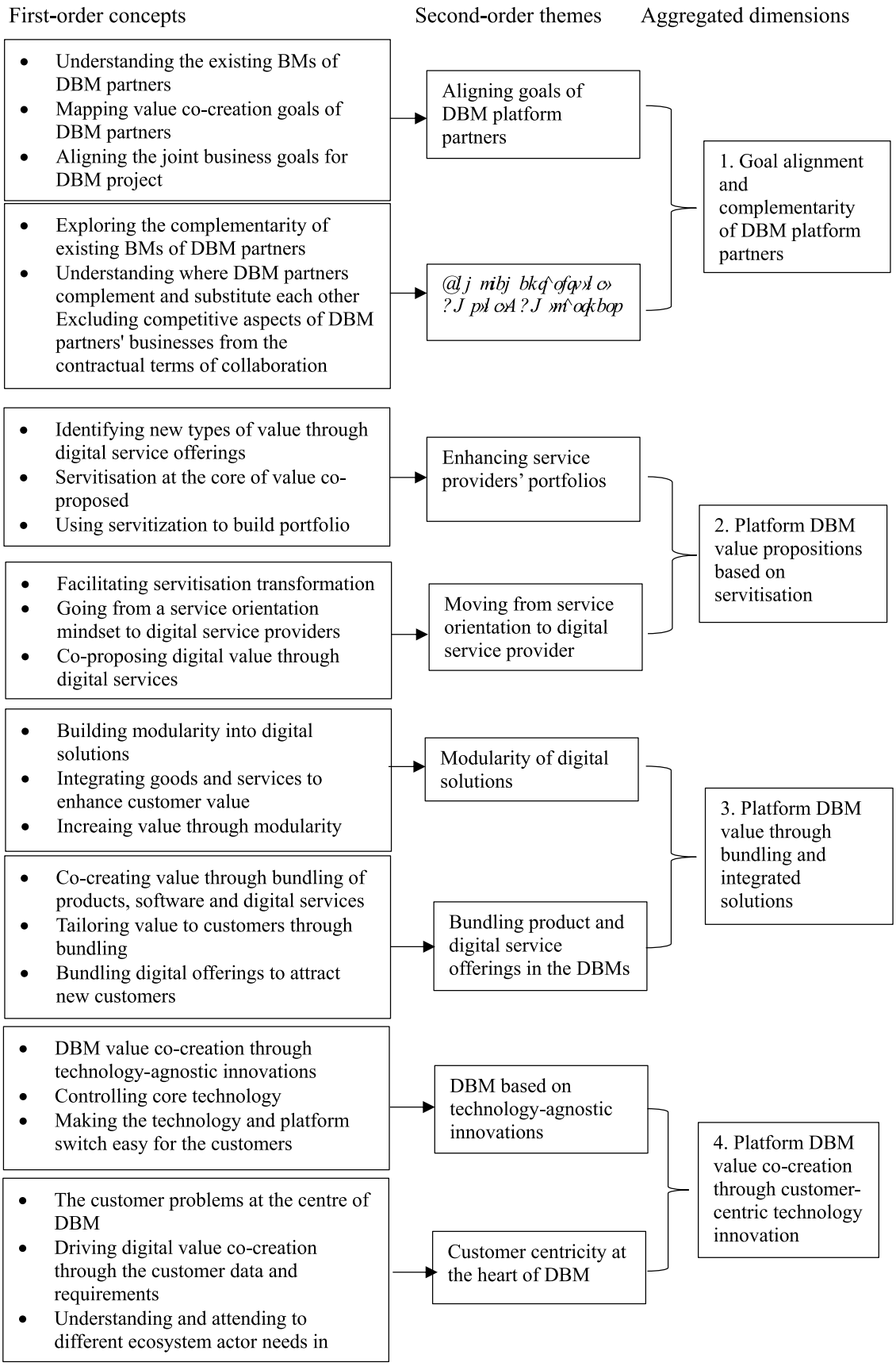

Fig. 3. Data Coding Structure: The DBM Value Co-Creation Key Managerial Activities.

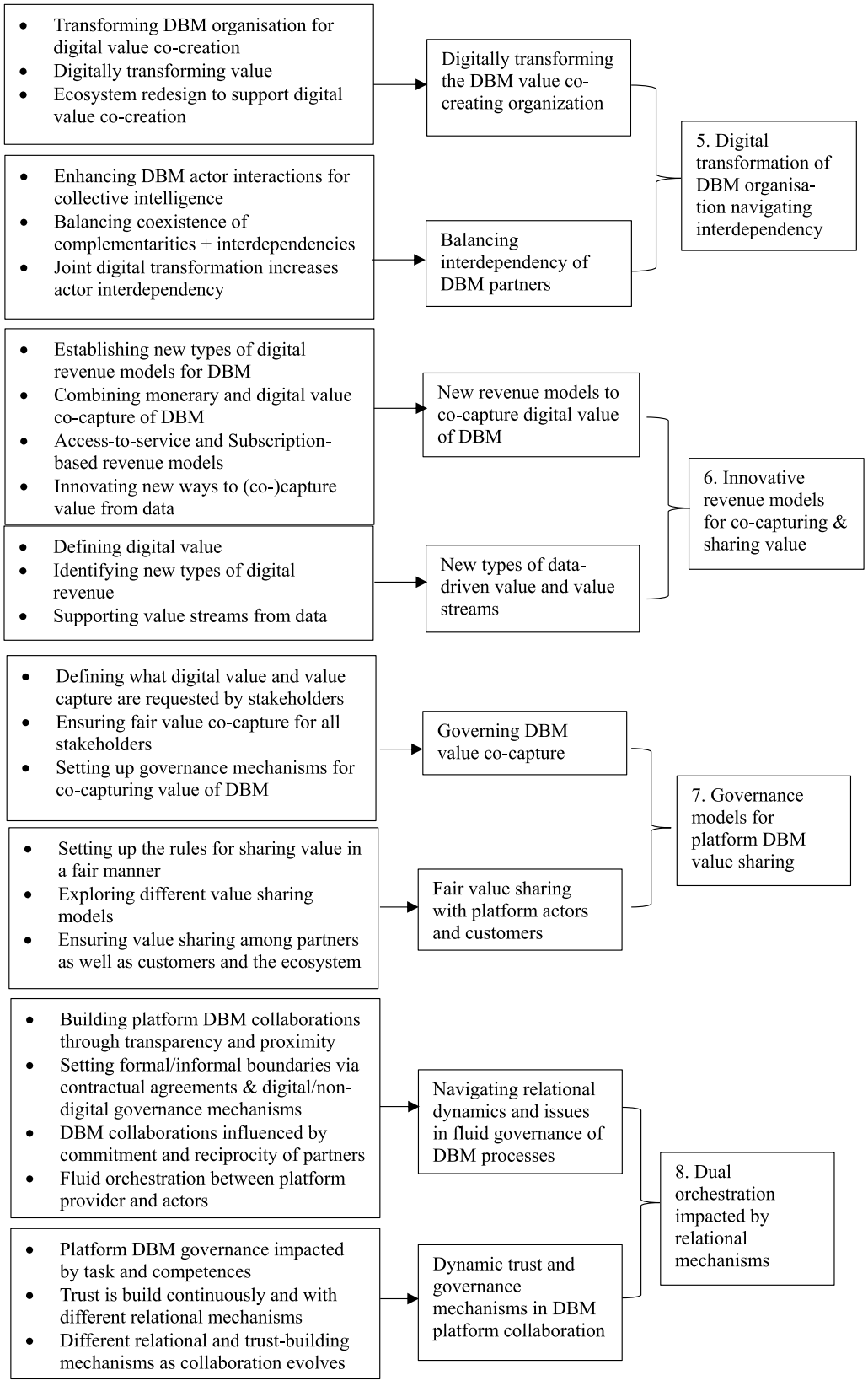

Fig. 3. (*continued*).

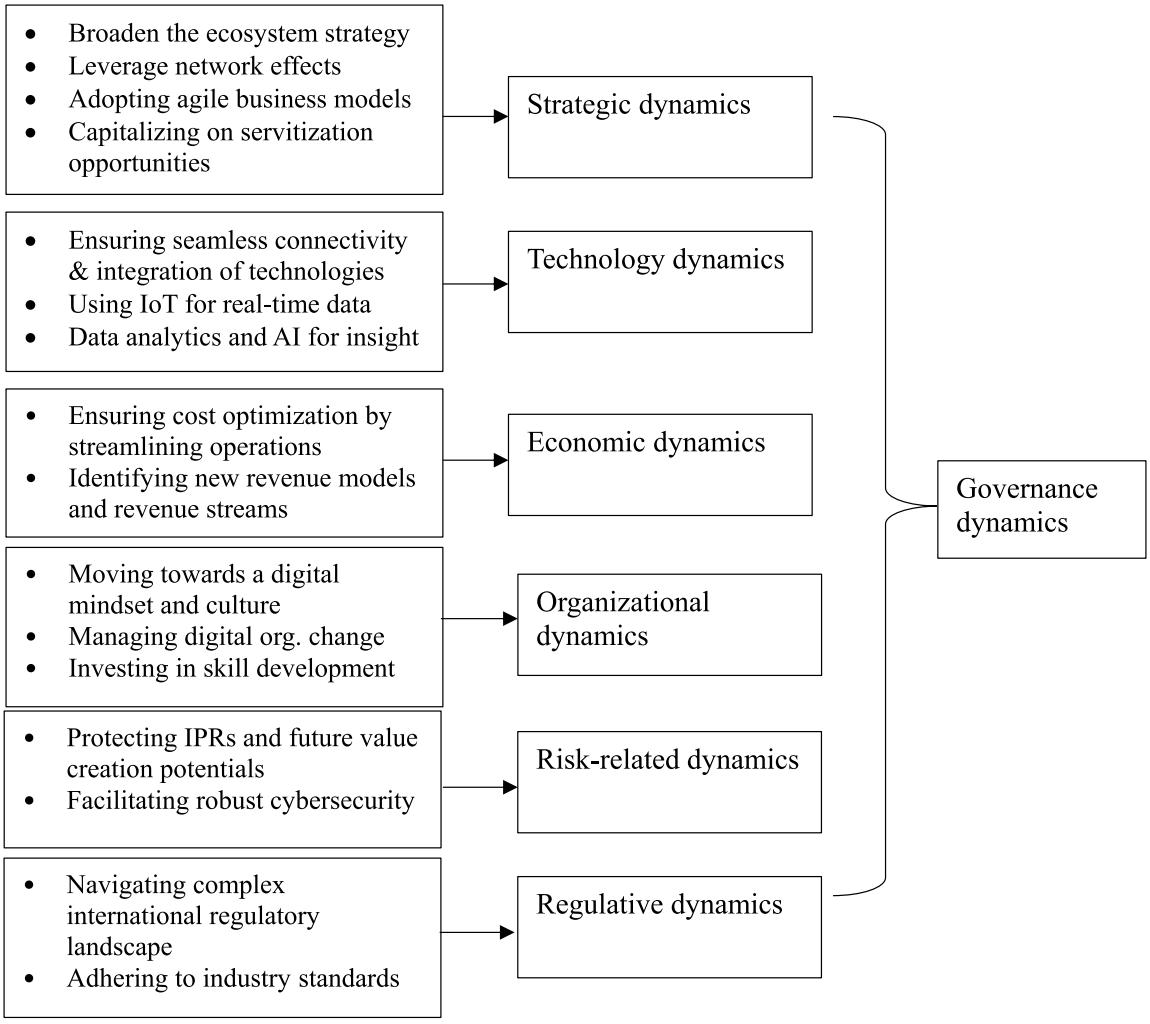

Fig. 4. Coding Protocol - Mapping Key Governance Dynamics of DBM Value Creation.

Table 4
Case Company Overview

Company	DBM example	Roles of the DBM collaborators	Value co-created	Informants	Archival data
Case A	Case A's IoT Suite used for intelligent water management systems at Case H	Case A provides the IoT platform, and Case H uses Case A′ IoT Suite for real-time monitoring, predictive maintenance, and optimizing water management systems	Enhanced operational efficiency and predictive maintenance services	1x Vice President 1x Senior Manager	8 documents 300+ pages in total
Case B	Case B's Assistant integrated into Case G's IoT platform for consumers at an global packing company	Case B's Cloud Platform integrates with Case G′ IoT devices at the packing company for predictive maintenance and operational efficiency, enhancing production uptime and reducing costs.	Predictive maintenance and operational efficiency, enhancing production uptime and reducing costs.	1x Senior Director 1x Senior Manager	7 documents 280+ pages in total
Case C	Case C's IoT used with Case G's sensors at international brewery	Case B offers the data analytics and integration platform. Case G's sensors provide crucial data to enhance efficiency and product quality. International Brewery provides the manufacturing site data	Improved brewing process and quality control	1x Senior Director 2x Senior Managers	5 documents 160+ pages in total
Case D	Case D used at SKF for 5G-enabled manufacturing	Case D provides 5G connectivity and Industrial IoT platform. SKF uses it to enhance machine monitoring, predictive maintenance, and operational efficiency.	Improved operational efficiency, reduced downtime, and enhanced production management	1x Senior Director 2x Senior Managers	5 documents 150+ pages in total
Case E	Case E and Case F combine platforms to enhance operational efficiency at Daimler AG.	Case E provides the Intelligent Asset Management and Project Portfolio Management platform, while Case F integrates it with Case F's IoT platform and Teamcenter to enhance operational efficiency and	Increased operational efficiency, reduced downtime, data-driven decision-making in manufacturing processes.	1x Senior Director 1x Senior Manager	6 documents 200+ pages in total

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Table 4 (*continued*)

Company	DBM example	Roles of the DBM collaborators	Value co-created	Informants	Archival data
		data-driven decision-making for manufacturing companies.			
Case F	Case F IoT platform used with Case H's IoT solutions to optimize water pumps	Case F has a dual role as complementor and platform provider in this study. E.g. in one of the value co-creation cases they provide the IoT platform, while Case H supplies the pumps and IoT solutions to optimize water pumps and motor schedules. In another value co-creation case Case F (Digital Industries Software) collaborate with Case A to make its cloud-enabled NX™ X software for product engineering available through Case A's cloud and AI platform and integrating it with generative AI and copilot features.	Optimized energy consumption and operational efficiency	1x CEO 3x Senior Managers	5 documents 130+ pages in total
Case G	Case G and Case C's Iot and Cloud platform used to improve Whirlpools manufacturing processes	Case G extends IoT Suite services, while Case C provides Cloud and for Whirlpool to enhance manufacturing processes and predictive maintenance.	Real-time monitoring and predictive maintenance	2x Executive Vice Presidents 4x Senior Directors	5 documents 140+ pages in total
Case H	Case H collaborating with Case D and Telenor Connexion for IoT ecosystem to manage water infrastructures	Case D provides connectivity solutions while Telenor offers IoT solutions, and Case H supplies water and manufacturing data.	Efficient water management and real-time data insights	1x Senior Vice President 1x Senior Director 2x Senior Managers	6 documents 180+ pages in total
Case I	Case I adopting UberCloud Engineering Simulation Platform based on Case A.	Case A provides cloud infrastructure, UberCloud offers simulation software, and Case I supplies manufacturing data.	Enhanced simulation accuracy and efficiency in engineering applications	2x Vice Presidents 2x Heads of Departments	5 documents 130+ pages in total
Case J	Case J integrating Case C's IoT platform to manage product quality and process efficiency.	Case J integrates health data with Case C's IoT and cognitive and knowledge-based health data analytics platform.	Improving data-driven decision-making, enhancing product quality, and optimizing production processes.	1x Senior Vice President 2x Vice Presidents	5 documents 110+ pages in total

Table 5a
Case Progression and Governance Dynamics Across DBM Phase

DBM Phase	Progression at this Phase	Supporting Quotes	Governance Dynamics Impacting the Phase	Supporting Quotes
Phase 1: Platform DBM Initiation	Establishing B2B platform partnerships by aligning strategic goals for the value to be co-created and for the customer problem to be solved, while reducing risk by building trust formally and informally	*"Case H is present where Case F is present. And hence we have a strong capability by joining forces and … combining offerings to the world." (Case H, Interviewee 1)*	Strategic Technology Risk	*"The platform allows us to integrate various technologies seamlessly, making it easier to collaborate and innovate." (Case G, Interviewee 3).* *"Our strategic goals have to align perfectly, which is crucial for the success of this partnership." (Case C, Interviewee 2).* *"Legal agreements and NDAs are put in place and aligned across the partners at this stage to mitigate any potential risks." (Case F, Interviewee 3)*
Phase 2: Platform DBM Value proposition	Co-developing value propositions for the value to be co-created across the B2B platform by integrating customer feedback, and leveraging complementary technologies in solving customer problem	*"We bounce ideas and suggestions and pick up wishes from them (customers) … we go out to observe on our own and see what you could actually do with software?" (Case I, Interviewee 4)*	Technology Strategic Economic	*"Identifying new digital value propositions requires leveraging the latest technologies available from all partners." (Case C, Interviewee 2).* *"The overall strategies of the DBM collaborators, either emphasizing reducing costs or developing new revenue streams, impact the focus of the value proposition we jointly decide on pursuing." (Case G, Interviewee 4).* *"Mapping and co-developing joint value propositions, while exploring new servitization opportunities is a critical activity." (Case F, Interviewee 1).*
Phase 3: Digital Transfor-mation of DBM Value Co-Creation	Transforming organizational processes, adopting digital tools, and fostering a culture of innovation.	*"The biggest challenge is probably the mindset change as we call it. Moving people. Making every individual and each business unit across the world or subsegment of our company understand … that digitalization is the disruptor." (Case F, Interviewee 4)*	Organizational Technological Economic	*"Transforming the organization to create digital value is crucial and involved significant changes in our processes, tasks, and in our culture." (Case F, Interviewee 2)* *"Combining and leveraging the necessary data and various digital technologies is essential for co-creating the suggested*

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Table 5a (*continued*)

DBM Phase	Progression at this Phase	Supporting Quotes	Governance Dynamics Impacting the Phase	Supporting Quotes
				customer value." (Case C, Interviewee 3) *"Investment in DBM project infrastructure is critical, but the division of investment and payoff must be fair." (Case H, Interviewee 3)*
Phase 4: DBM Platform Value Co-capture & -sharing	Developing new revenue models in making sure value is co-captured in a fair manner across the B2B platform, while at the same time complying with national and international regulations.	*"We're moving from a transaction- based model to a recurring business model. Typically, right now we are testing different types of subscriptions." (Case G, Interviewee 2)*	Economic Risk Regulative	*"We had to create new revenue models to co-capture value, which is a challenging task, but a necessary part of capturing value across the platform partnerships" (Case D, Interviewee 3)* *"High levels of cybersecurity are required to protect the data used across the platform for the value co-captured." (Case F, Interviewee 1)* *"Ensuring that value capture complies with national and international regulations is critical." (Case G, Interviewee 6)*

Table 5b
Navigating Relational Issues through Governance Adaptation Mechanisms

DBM Phase	Relational Issues	Governance adaptation mechanisms supporting collaboration	Case example of governance mechanisms	Illustrative Quotes
Platform DBM Initiation	Protection of IP Strategic alignment Managing expectations	Formal agreements Initial alignment meetings Decentralized governance	Case H: Legal frameworks to protect IP	*"It requires a high level of trust. And this is also reflected in the legal work that we have done together. That goes without saying that both companies are taking care of their own IP, IPR and legal property rights."* *– Case H, interviewee 3*
			Case F: Decentralized decision-making process to build enabling shared ownership of decisions	*"In the initial phase, we made sure that governance was not centralized. Each partner had a say in the decision-making process, which helped build trust early on." – Case F, interviewee 2*
			Case G: Conducting and aligning joint risk assessments	*"By performing joint risk assessments, we ensured that both parties were aware of potential pitfalls and could plan accordingly."* *– Case G, interviewee 2*
			Case I: Setting up dedicated teams for initiating the collaboration	*"We established dedicated teams from both companies to work on initial integration tasks, fostering a collaborative spirit from the start." – Case I, interviewee 3*
Platform DBM Value Proposi-tion	Differing perspectives on customer needs Data integration Effective communica-tion strategies	Customer engagement activities Reciprocal data exchange, Regular workshops and feedback sessions	Case I: Collaborative value proposition development with customers	*"We bounce ideas and suggestions and pick up wishes from them (customers) … we go out to … observe on our own and see what could you actually do with software? But we also ask the customers what are their biggest pains and hurdles that they would like to get fixed."* *– Case I, interviewee 4*
			Case G: Regular workshops and feedback sessions	*"Engagement with our partners and customers was key. We set up regular workshops and feedback sessions to ensure we were on the right track and addressing real pain points."* *– Case G, interviewee 5*
			Case F: Joint innovation sessions with customers	*"We held joint innovation sessions with our customers to co-create solutions that directly addressed their needs."* *– Case F, interviewee 1*
			Case H: Data sharing agreements to facilitate integration	*"By setting up data sharing agreements, we ensured that data could be seamlessly integrated and utilized by all partners."* *– Case H, interviewee 3*
Digital Transformation of DBM Value Co-Creation	Organizational inertia Resistance to change Aligning of digital processes and tools	Investing in joint project organizations Emphasizing transparency, Creating shared digital workspaces	Case F: Transparency in decision-making and mutual investment	*"The biggest challenge is probably the mindset change as we call it. Moving people. Making every individual and each business unit across the world or subsegment of our company understand … that digitalization is the disruptor."* *– Case F, interviewee 4*
			Case H: Shared digital workspace for collective innovation	*"Creating a shared digital workspace where all partners could access and contribute to project data was a game-changer. It ensured everyone was on the same page and helped in driving collective innovation."* *- Case H, interviewee 1*
			Case G: Training programs for digital tools and processes	*"We implemented extensive training programs to ensure all partners were proficient with the new digital tools and*

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Table 5b (*continued*)

DBM Phase	Relational Issues	Governance adaptation mechanisms supporting collaboration	Case example of governance mechanisms	Illustrative Quotes
				processes." – *Case G, interviewee 6*
			Case I: Setting up a joint project management office (PMO)	*"Establishing a joint PMO helped in coordinating efforts and maintaining transparency across all project activities."* – *Case I, interviewee 3*
Platform DBM Value Co-capture & -Sharing	Negotiating fair value-sharing models Evaluating profit margins, Leveraging investment vs. returns	Robust monitoring and governance mechanisms Developing subscription-based models Continuous feedback and adaptation	Case G: Testing subscription-based models	*"We are moving from a transaction-based model to a recurring business model. Typically, right now we are testing different types of subscriptions."* – *Case G, interviewee 2*
			Case I: Flexible governance framework for continuous feedback	*"We established a governance framework that allowed for continuous feedback and adaptation. This flexibility was crucial in addressing the evolving market needs and maintaining trust among partners."* – *Case I, interviewee 2*
			Case F: Regular financial performance reviews	*"Conducting regular financial performance reviews ensured that all partners were satisfied with the value-sharing arrangements."* - *Case F, interviewee 1*
			Case H: Developing long-term incentive plans for partners	*"We created long-term incentive plans to align the interests of all partners and ensure sustained collaboration."* – *Case H, interviewee 4*
			Case E: Implementing performance tracking dashboards for transparency	*"We rolled out performance tracking dashboards accessible to all partners to maintain transparency and trust."* - *Case E, interviewee 1*
			Case B: Leveraging AI-driven insights for continuous improvement	*"We provide actionable data to our partners, fostering a continuous improvement mindset."* – *Case B, interviewee 1*

Table 6
Interview Guide

CASE STUDY INTERVIEW GUIDE

1. INTRODUCTION TO THE INFORMANT
1.1. Please briefly introduce yourself and describe your role in business development and digitalization of your company?
1.2. How long have you been in the company and in the industry?
2. DIGITAL TRANSFORMATION
2.1. What do you experience as the most challenging in making the digital transformation and moving towards digital business models?
2.2. Which role has servitization played in your digital transformation?
2.2.1. In what ways has the organization changed internally?
2.2.2. Which impact has the digital transformation had on your KPIs and measures of success?
2.2.3. In what ways have you (tried) to impact the mindset, capabilities and cultural change as part of your organization's digital transformation?
2.3. How has your ecosystem and external organisation (customers, suppliers etc) changed with your digital transformation?
3. PLATFORMS
3.1. Could you explain the most recent digital business model you have developed using a digital platform?
3.1.1. Who did you collaborate with?
3.1.2. What did they contribute with?
3.2. What were your experiences with co-proposing, co-creating and co-capturing value?
3.3. What did you experience as the most challenges in co-creating and co-capturing value from platforms?
3.4 What have you learned from applying platforms for digital business development?
4. DIGITAL ECOSYSTEMS
4.1. Could you describe the digital ecosystem you engaged with and your company's role?
4.2. How did you interact with/govern the ecosystem?
4.3. What is the most important thing, when building and in driving digital ecosystem?
4.4. How did you build trust into the collaboration?
4.5. How did you make sure that the value was captured fairly across the ecosystem actors?
5. VALUE CO-CREATION & CO-CAPTURE IN PLATFORM ECOSYSTEMS
5.1. Could you elaborate on what the modes of creating value through digital business models in digital ecosystems?
5.2. Which activities did you have to do in order to ensure that the process of developing a new (digital) business model starts up and is successful?
5.3. As the relationship developed, what did you have to do in order to make sure the collaboration works as planned?
5.4. What were the key challenges in governing DBM processes using digital platforms?
5.4.1. Which activities, processes and governance had to be in place in order to exchange relevant data, while protecting the uniqueness of your own IP?
5.5. What kind of activities and interventions did you have to carry out to co-create/co-capture value better?

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Table 6 (*continued*)

CASE STUDY INTERVIEW GUIDE
5.6. Which factors impacted the different phases of developing the platform based DBM?
5.6.1. And to what extent?
5.7. What is needed to achieve the highest mode of collaboration within a digital platform for you and your complementor to jointly innovate?
5.8. What develops trust in platform collaborations?
5.8.1. And how does trust evolve during the collaboration?
5.9. What has been the most surprising for you so far in developing digital business models using digital platforms?

Table 7
Cross Case Analysis of Firm Role Transitions and Governance in Dual Orchestration of DBMs

Case Company	Shifting Role in DBM Collaboration (Dual Orchestration)	Governance & Value Co-Creation Adaptation Mechanisms	Case-Specific Contribution to DBM Phases, Managerial Actions, and Relational Dynamics
Case A (PP)	Evolves from a platform orchestrator to a co-developer of DBMs with industrial partners, adapting cloud-based solutions to industry-specific needs.	Adapts governance roles across DBM phases; co-develops compliance frameworks to align cloud-based DBMs with sector-specific regulations.	Engages in DBM Initiation by aligning goals and ensuring DBM complementarity with cloud-driven architectures. Supports Digitally Transforming DBM Value Co-Creation by facilitating scalable cloud-based integration and governance adaptation. Context-specific due to enterprise security, regulatory compliance, and AI-driven governance models.
Case E (PP)	Transitions from a software infrastructure provider to a collaborative DBM architect, co-designing sector-specific business models.	Balances governance standardization with flexibility; integrates revenue-sharing models adapting to industrial partner needs.	Contributes to Co-Proposing Platform DBM Value by developing servitization-based value propositions and structured business model frameworks. Supports Establishing Value Co-Capture & Sharing Mechanisms through revenue-sharing governance models. Context-specific due to ERP integration and legacy system adaptability.
Case D (PP)	Moves from a connectivity enabler to a co-investor in IoT-driven DBMs, adjusting governance strategies based on industry needs.	Co-develops regulatory and security governance models with partners; enables distributed decision-making in IoT ecosystems.	Supports Digitally Transforming DBM Value Co-Creation by integrating networked governance and distributed IoT to ensure transparency. Engages in Co-Proposing DBM Value through bundling IoT data for customer-centric value. Context-driven by real-time industrial IoT governance requirements.
Case C (PP)	Starts as an AI-driven analytics provider but transitions to a co-governance partner, shaping data-sharing mechanisms in DBMs.	Develops joint AI governance structures with industry partners; ensures transparency in algorithmic decision-making.	Strengthens Co-Proposing DBM Value by driving customer-centric, technology-agnostic AI solutions. Engages in Establishing Value Co-Capture & Sharing Mechanisms by implementing algorithmic governance for equitable data use. Contextually shaped by cross-industry data security compliance.
Case B (PP)	Moves from a traditional cloud orchestrator to a co-governance model in DBMs, emphasizing multi-cloud interoperability.	Collaborates with industrial partners to prevent platform dependency risks; leads in AI-based transparency and decision-support governance.	Supports DBM Initiation by ensuring goal alignment and digital interoperability. Engages in Digitally Transforming DBM Value Co-Creation by adapting data-sharing transparency governance models. Context-specific due to open AI governance and multi-cloud architecture.
Case H (MF)	Transitions from a manufacturer-driven servitization model to a co-orchestrator of platform-based DBMs, leading sustainability governance.	Develops governance models for sustainability-driven DBMs; aligns platform capabilities with real-time environmental compliance needs.	Contributes to Co-Proposing DBM Value by bundling platform-driven sustainability offerings. Engages in Establishing Value Co-Capture & Sharing Mechanisms by aligning sustainability governance and revenue-sharing for circular economy initiatives. Contextually influenced by environmental compliance and industrial water management goals.
Case G (MF)	Moves from a complementor to a governance leader in IoT-driven DBMs, influencing industry-wide data governance structures.	Balances regulatory compliance with AI-driven predictive maintenance governance; drives decision-making structures for long-term platform adoption.	Engages in Co-Proposing DBM Value by driving predictive maintenance solutions and customer-centric bundling. Contributes to Digitally Transforming DBM Value Co-Creationby aligning AI-based governance models with industry-wide security frameworks. Context-specific due to industrial IoT adoption in predictive manufacturing.
Case J (MF)	Shifts between compliance enforcer and co-creator of DBMs, pushing platform providers toward strict governance alignment.	Implements stringent data governance policies; ensures compliance-driven DBM adaptation in pharmaceutical ecosystems.	Supports DBM Initiation by aligning business model complementarity under strict pharmaceutical regulations. Engages in Establishing Value Co-Capture & Sharing Mechanisms through regulatory-driven data-sharing agreements. Contextually constrained by pharmaceutical sector compliance and patient data protection.
Case I (MF)	Evolves from a traditional manufacturing partner to a governance orchestrator in emissions monitoring and sustainability-led DBMs.	Leads in regulatory adaptation; integrates sustainability compliance frameworks within platform governance.	Contributes to Digitally Transforming DBM Value Co-Creationby leading sustainability governance adaptation in emissions control. Engages in Establishing Value Co-Capture & Sharing Mechanisms through compliance-based financial governance models.

(*continued on next page*)

Table 7 (*continued*)

Case Company	Shifting Role in DBM Collaboration (Dual Orchestration)	Governance & Value Co-Creation Adaptation Mechanisms	Case-Specific Contribution to DBM Phases, Managerial Actions, and Relational Dynamics
Case F (MF & PP)	Embodies dual orchestration, actively shifting between platform provider and complementor roles across multiple DBMs.	Balances governance leadership and co-development roles, dynamically adjusting governance structures throughout DBM phases.	Context-specific due to global regulatory constraints on heavy industry emissions. Supports DBM Initiation by aligning strategic objectives across industrial and digital platforms. Engages in Digitally Transforming DBM Value Co-Creation through co-investment inf joint digital transformation projects. Contextually unique due to its ability to orchestrate and participate in multiple industrial ecosystems simultaneously.

Table 8
Relational mechanisms enabling dual orchestration across cases (cross-case evidence)

Relational Mechanism	Definition in context of dual orchestration	Illustrative Case Evidence	Example Cases (documented)
Transparency	Open, auditable information sharing that reduces asymmetries and enables adaptive governance.	Partners adopted open-book financial reporting, joint dashboards, and shared technological roadmaps to align expectations.	**Case F's IoT platform:** quarterly open-book financial reviews. **Case I ECS/ProcessExpert:** transparent performance monitoring with shared reporting. **Case D IoT platform:** data-sharing protocols for adoption tracking.
Reciprocity	Mutual responsiveness to evolving partner contributions and outcomes.	Revenue-sharing formulas and responsibilities were renegotiated in response to shifts in adoption and joint product development.	**Case F's IoT platform:** move from equal to performance-weighted revenue splits. **Case I ECS/ProcessExpert:** renegotiation of revenue shares after new joint developments. **Case G–Case E:** adaptation of service responsibilities in response to partner input.
Commitment	Long-term orientation and sustained investment in joint collaboration infrastructure.	Firms invested in cross-firm project organizations, joint infrastructure, and staff integration despite uncertain short-term returns.	**Case C:** creation of joint project organization with manufacturing partners - Case G and Case F. **Case A–Case H:** predictive maintenance pilots scaled despite uncertain adoption. **Case F:** sustained investment in ecosystem integration despite delayed returns.
Proximity	Organizational and cognitive closeness built through repeated interaction and co-location.	Co-located teams, joint training, and continuous interactions reduced frictions and aligned cultures.	**Case H–Case A:** joint workshops and continuous interaction on Case A's platform/ Case H solutions. **Case D–Case F:** co-location of IoT developers. **Case I:** close collaboration between engineering teams on-site.
Coopetition	Simultaneous cooperation and competition among partners.	Partners co-developed digital solutions while also offering competing products and services.	**Case G–Case E:** collaboration on digital services while maintaining competing portfolios. **Case F:** coopetition with complementors developing overlapping analytics solutions. **Case D IoT platform:** coopetition with partners in telecom and industrial IoT.

Table 8 in the Appendix illustrates how these relational mechanisms manifested across our focal cases, providing concrete evidence of transparency, reciprocity, commitment, proximity, and coopetition as enablers of dual orchestration.

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Annabeth Aagaard is Professor of Digital & Sustainable Business Development at Aarhus University, Department of Management, and the founding director of Interdisciplinary Centre for Digital Business Development. Her research is focused on digital and sustainable business development and how to facilitate and govern value creation and innovation through platforms and ecosystems. She has authored and co-authored nineteen textbooks and published scientific papers in journals such as Journal of Product Innovation Management, Industrial Marketing Management etc. She is heavily involved in European and national research projects in the areas of digital and sustainable transformation sponsored by industrial foundations and HorizonEurope and furthermore acts as a public speaker, board member and strategic advisor to industry on digital and sustainable topics.

Wim Vanhaverbeke is professor Digital Strategy and Innovation at the University of Antwerp and was visiting professor at NUS (Singapore) and Esade (Spain) for more than 10 years. He is editor-in-chief of Technovation. His current research is focusing on digital strategies and transformation, innovation ecosystems and open innovation. He has published in international journals such as Organization Science, Journal of Management, Research Policy, California Management Review. He has co-edited four books on open innovation and written a book about managing open innovation in SMEs. He is appointed as member of the Advisory Committee of the Research Center for Technological Innovation of the Tsinghua University.

Oliver Gassmann is Professor of Technology Management at the University of St. Gallen, Switzerland and Director of the Institute of Technology Management. At the core of his research is the pervading question of how companies innovate and profit from innovation. Thus, he is dedicated to discovering new approaches to the management of technology and innovation that contribute to firms' competitive advantage. Oliver has published in leading journals such as Research Policy, R&D Management, International Journal of Technology Management, Journal of World Business, European Management Journal, IEEE Transactions on Engineering Management, Journal of Technology Transfer, Harvard Business Manager.