

Dissertation

Global Value Chain Governance Dynamics: A Co-Evolutionary Perspective on the Transition from Relational to Modular Governance in Construction

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Keywords: global value chains, governance, modularity, construction, digitalisation

<https://doi.org/10.46697/001c.88528>

AIB Insights

Vol. 23, Issue 5, 2023

Global value chain (GVC) governance theory explains how GVCs are controlled and organised. A large body of research examines how GVC governance varies across industries, however, GVC governance dynamics within industries receive less attention. This study bridges the gap between GVC and international business theories to focus on GVC governance heterogeneity as a source of competitive advantage. Through mixed-methods including grounded theory, structural equation modelling, and comparative case studies, the research reveals the interplay between network-orchestration and network-dependence as lead firms shape GVC governance transitions. Insights can help managers optimise complex GVC governance structures, particularly in the context of digitalisation.

BIG QUESTION

How and why do global value chains transition between governance types and what can we learn from the context of construction digitalisation?

INTRODUCTION

Global value chains (GVCs) and their governance structures (how they are controlled and organised) are widely recognised as fundamental to the world economy. The socio-economic importance of the structure and governance of GVCs was recently reinforced by abrupt disruption to the global economy during the COVID-19 pandemic. Scholars have engaged with GVC governance constructs discussed by Gereffi and colleagues (2005), which include five stylised types – hierarchy, captive, relational, modular and market – that range from high to low levels of power asymmetry and explicit coordination between lead firms and suppliers. Yet industry-level perspectives dominate the literature, with less research examining GVC governance from the perspective of lead firms and their roles in determining governance structures (McWilliam, Kim, Mudambi, & Nielsen, 2020). The international business (IB) literature provides important related research, linking the strategic motivations of multinational enterprises (MNEs) with their international

investment decisions. There is also relevant research on how digital technologies have supported GVC structures, with profound change in how firms share knowledge, innovate and distribute value. However, across both the GVC and IB fields, current empirical and theoretical research does not fully explain the process of transition between governance structures, nor potentially related factors that may give rise to heterogeneity of governance types within an industry.

The objective of the dissertation is to bridge this gap by developing a stronger empirical and theoretical understanding of how and why GVC governance transitions occur, focusing on dynamics in governance associated with digitalisation in construction GVCs.

To address this objective, the dissertation draws on literature relating to GVC governance, IB, and economic geography, alongside industry literature related to the empirical research. The empirical focus is on the construction industry, where new technologies are enabling an industry-wide shift from relational to modular governance for the production of complex buildings and infrastructure. Relational governance arises in GVCs where such complex products make it difficult to codify information, resulting in coordination between actors that relies on tacit information exchange. Modular governance arises when the ability to codify information extends to complex products, enabling

^a PhD awarded by The University of Sydney (2022)

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actors to rely less on tacit information and to divide activities into more autonomous modules. GVC literature predicts that highly codified information is the key industry characteristic distinguishing modular from relational governance. In construction, technologies such as digital engineering and building information modelling were widely anticipated to disrupt the industry, effectively unlocking the transition to modular governance as observed in the automotive and aviation industries. Yet, construction continues to rely heavily on relational exchange and to lag in cross-industry indices for productivity and digitalisation. Construction presents idiosyncrasies typical to complex industries, with GVCs that disperse activities across multiple countries and companies. However, its GVCs are also distinct from automotive and aviation, in that they are both episodic (typically for the duration of just one construction project) and multipolar (involving multiple 'co-lead firms'). Multipolar GVCs are distinct from unipolar GVCs (which have just one lead firm) because co-lead firms share authority and power (Ponte & Sturgeon, 2014). Examples of co-lead firms in construction GVCs include state infrastructure owners, engineering and design leads, and construction leads. Despite decades of research into persistent productivity challenges, the construction industry still faces barriers to change and will benefit from new insights associated with the GVC governance lens.

Following a literature review, the research applies a sequential mixed methods approach across three analysis chapters that (1) explores the GVC-embedded lead firm as network orchestrator; (2) tests theory on the GVC-embedded lead firm as network-dependent; and (3) explains comparative case studies in relation to integrated theories of network control. Insights related to each of these themes are described below.

NETWORK ORCHESTRATION

First, the dissertation explores network orchestration. An instrumental case study with a grounded theory approach allows for assessment of a global engineering firm's role as a co-lead firm driving the transition from relational to modular governance within its construction GVCs. The case firm is headquartered in London, with around 15,000 staff in over 90 offices, across more than 35 countries. In 2018, they participated in projects in over 140 countries with a revenue in excess of £1.5bn. The research finds that the MNE uses orchestration capabilities to progressively adapt, then integrate, new coordination mechanisms, first within their organisation, then across their GVCs. It illustrates that a transition in GVC governance is not determined solely by characteristics of the industry and suppliers (as emphasised within GVC governance literature), but also by the strategy and orchestration capabilities through which firms purposively drive adaptation across the GVC. The findings align with the argument by Ghoshal and Moran (1996) that transaction cost theory is weakened by its lack of recognition of purposive, coordinated adaptation. By finding that lead firms use orchestration capabilities to purposively adapt governance structures, the research chal-

lenges the implicit rhetoric in GVC literature that positions governance 'as a *given*', driven by market or industry characteristics. The research argues for positioning governance 'as a *strategy*', enabled by lead firm orchestration capabilities and driven through dynamic, interorganisational collaboration.

The findings indicate that it is important for managers to consider where increasing supplier power or multipolarity (Ponte & Sturgeon, 2014) may be altering the dynamics underlying GVC governance decisions – and responding to these changes. At a more detailed level, lead firms with a strategic objective to drive a transition to modular governance can evaluate their strategy against the actions and outcomes observed in this case. Analysis of the case finds that managers orchestrated four specific outcomes that overcome constraints to leveraging digital technology and codified information across the value chain. First, managers led the *adaptation* of internal information exchange capabilities, by uplifting digital infrastructure, operational processes, and developing staff and teams. Second, they led the *integration* of adapted information exchange capabilities across internal global networks, through embedding knowledge across the organisation, globalising project teams and supporting staff mobility. Third, managers led *node reform* within the construction GVCs, which involved reforming information transfer, agreeing roles and gatekeepers, and setting standards and controls. Finally, they expanded to *GVC reform*, enabled by redefining project structures, advocating across GVCs, and advocating for institutional reform. By demonstrating how the lead firm's role in shaping governance can be broken down into these intermediate outcomes and associated actions, the study provides a framework that can be adapted to different organisational parameters.

NETWORK DEPENDENCE

Second, the dissertation examines network dependence. Structural equation modelling of 1274 construction projects quantifies co-lead firm dependence on external factors for successfully shaping such a governance transition and additionally considers the associated relationship with firm performance. This method allows for simultaneous modelling of multiple hypothesised relationships, rather than focusing on one specific relationship. It is this simultaneity, as well as the challenge against competing models, that confers integrity and relevance to the analyses. The results confirm that the codifiability of information, the capabilities of suppliers, and orchestration capabilities are determinants of GVC governance. Reliance on these combined determinants highlights the importance of co-lead firm ownership advantages derived in relation to both internal and external capabilities (Alcácer, Cantwell, & Piscitello, 2016) when determining governance. This helps to explain why co-lead firms may not simply 'decide' to change the governance structure of a GVC; rather, they need to work collaboratively.

The results also show that increased modularity in GVC governance is positively related to the co-lead firm's fi-

nancial performance. This finding supports the often assumed, but rarely tested, financial effect of an improved GVC governance structure and contributes to the debate on the performance benefits of modular governance over other forms (e.g., Sturgeon, 2002). The results provide managers in lead firms with important evidence that improved GVC governance structures can help overcome liabilities associated with the complexity of disaggregated networks of specialised firms. In highly disaggregated GVCs, firms need to overcome such “liabilities of fragmentation”, which encompass risks and costs associated with outsourcing, coordination, and co-operation between multiple co-lead firms. Combinations of all these risks may be found in complex GVCs such as construction. Investing in working toward the optimisation of GVC governance may therefore be a valuable strategy for overcoming these long-term ongoing liabilities.

There is currently only limited understanding of the costs associated with increased fragmentation, and more specifically, of the costs and performance advantages associated with different governance modes. However, the validity and importance of these costs is supported by the literature. In particular, Celo and colleagues (2018) find that, although the global factory literature emphasises the advantages of extensive outsourcing and offshoring to lead firms, it underestimates the added difficulties that firms face in coordinating the complex GVC structures that result. The analyses here suggest that complex coordination costs can be overcome, not only through forms of internalisation, but also by efforts towards optimising the type of externalised network governance.

INTEGRATED NETWORK CONTROL

Third, the dissertation integrates theories of network control. Insights from comparative case studies provide a process perspective on the relationships suggested in the quantitative analysis. The process lens helps to build an understanding of why and how GVC governance transitions occur over time in the context of triadic interactions among firms, networks, and locations. Four cases were selected from the sample of 1274 construction projects, with a consistent type of development (rail construction) and consistent large scale (indicated by a capital cost greater than USD\$2bn). Case analysis provides evidence that governance transitions in complex construction GVCs occur incrementally over time, driven by a competitive imperative in which MNEs convert transactional ownership advantages into network-related governance advantages and then into resource- and asset-related ownership advantages. The case MNEs drive this process for converting between firm- and network-level competitive advantage through decisions relating to experiential learning (exploratory versus exploitative and intra- versus inter-organisational) and modularity (technological versus organisational domains and micro versus macro governance characteristics). Co-lead firms can navigate and overcome complex and interactive barriers to modularity within the transition process, including lever-

aging strong orchestration capabilities as a substitute for power asymmetries among GVC firms.

A key finding from this comparative case analysis is that, despite the wide availability of sophisticated tools to codify information (such as digital engineering software), considerable friction still constrains the construction industry from transitioning to modular governance. This results in an incremental transition process and persistence of relational governance characteristics. Sources of friction constraining construction GVCs relate to three barriers: inadequate requirements for *how* to exchange the codified information; insufficient coordination capabilities in co-lead firms and suppliers; and under-developed orchestration capabilities in co-lead firms. There are mitigating actions managers in co-lead firms can take to address these barriers. First, they can reduce the scope of the governance transition to overcome coordination capability gaps, e.g., to the ‘micro-level’ of governance (across a single value chain node); or to intra-organisational (rather than inter-organisational) learning. Second, managers can extend the duration of the transition, enabling more time to build capabilities or to overcome barriers relating to contractual requirements for exchanging codified information. Third, managers can strengthen orchestration capabilities (e.g., for leveraging complementarities with external firms) to overcome weak power asymmetries, including among co-lead firms. The dissertation includes detailed examples of how these barriers manifest in the cases and how firms have enacted each of these mitigating actions.

Prior to overcoming barriers to a governance transition, co-lead firms can improve the likelihood of success by undertaking a detailed evaluation and planning phase. Decisions relating to the complexity of the exploratory or exploitative approach are a critical part of this early planning. Co-lead firms need to ensure they leverage the right experience, knowledge, and resources to bring a deep understanding of the context, barriers, and opportunities. Such an understanding can enable more predictable outcomes by managing the balance among risk, reward, control, and environmental uncertainty. This evaluation should include consideration of how the barriers and opportunities vary with local regulatory institutions and local supplier capabilities. For example, the case analysis indicated barriers were higher in locations where construction regulators were slow to adopt information exchange tools associated with new digital engineering technologies. Without institutional support, the capabilities in local firms and suppliers were also less advanced.

CONCLUSION

The findings from the three studies add to the perspectives offered by theories associated with transaction costs (emphasis on costs, hold-up risks, and efficiency) and GVCs (emphasis on coordination, switching costs, and power asymmetries). While differences in the codifiability of information, the complexity of transactions, and the coordination capabilities of suppliers remain central to understanding the heterogeneity of GVC governance typologies

across industries, they do not adequately explain the process of transition between governance structures, or the factors that can give rise to *within-industry* governance heterogeneity. Such factors include the orchestration capabilities of lead firms, the dynamic capabilities of suppliers, and performance advantage expectations. If these factors are only partially present, GVC governance transitions may take more time, following incrementally progressive co-evolutionary cycles of experiential learning. By revealing these nuances for how network dependence (i.e., reliance on other GVC actors) can constrain network orchestration (in this case, determining a GVC governance transition), the research develops a contribution into how theories of network control may be better integrated across disciplinary perspectives, allowing for co-evolving interdependencies between firms, networks, and locations.

The research supplies pragmatic insights relevant for managers in multinational enterprises, particularly where, like the case examples, value chains are complex, multipolar, or episodic. These insights offer a contribution to understanding of (1) the constraints to leveraging digital technologies to shift to more modular governance across firm and industry value chains; (2) the relationships between

modular governance and firm performance and (3) a process perspective on how GVC governance transitions occur in complex industries. The final chapter considers the implications of the findings in the context of dramatic changes to global trade observed during the Covid-19 global pandemic.

ABOUT THE AUTHOR

Sarah McWilliam undertook her doctoral studies after working as an architect in the construction industry for over 10 years. Her work benefited from cross-disciplinary supervision from both the Business School (Prof. Bo B. Nielsen) and the School of Architecture Design and Planning (Prof. Chris L Smith). She is currently working in industry while continuing to progress publications from her research.

Submitted: July 20, 2023 EST, Accepted: October 12, 2023 EST



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