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Responsibility boundaries and the governance of global value chains: The interplay of efficiency, ethical, and institutional pressures in global strategy

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Abstract

Research Summary: I explore the relationship of firm global strategy and global value chain (GVC) governance, within a context of expanding responsibility boundaries for unethical practices in the value chain. Specifically, focusing on the tantalum supply chain within the digital electronics GVC, I conduct a case-based process study that contextualizes the different strategic responses of three manufacturers of tantalum capacitors when faced with similar efficiency, ethical, and institutional pressures. Integrating the GVC and global strategy literatures, I find that structural inertia in GVCs limits the efficacy of strategies that preserve, rather than alter, the governance structure, instead requiring a strategic restructuring carried out by individual firms, whose internalization of responsibility boundaries is encouraged by the institutionalization of these boundaries through public policy.

Managerial Summary: Unethical practices within global value chains are increasingly becoming the responsibility of firms with no direct control over such practices, leading to growing pressures for firms to alter their global strategies to meet social and institutional

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demands. Research has focused on strategies that preserve the structure of the value chain, despite questions about the efficacy of these approaches. By looking at the case of “conflict minerals” within the digital electronics value chain, this study finds that inherent flaws in value chain structures, which managers can identify, require individual firms to implement strategies that change the structure of the value chain, specifically by increasing ownership and control over the linkages where unethical practices occur and encouraging public policies that add value to these strategies.

KEYWORDS

conflict minerals, global strategy, global value chains, public policy, responsibility boundaries

1 | INTRODUCTION

Global value chains (GVCs) featuring de-integrated, network-based governance modes, between markets and hierarchies, have come to characterize the supply chains vital to many industries in our globalized economy (Gereffi et al., 2005; Kano, 2018; Kano et al., 2020; Strange & Humphrey, 2019). In addition to considering the power asymmetries and relational characteristics of value chain participants (e.g., Gereffi et al., 2005), the governance of GVCs is largely determined by efficiency considerations grounded in transaction cost economics (TCE) (e.g., Hennart, 1993; Williamson, 1975, 1979). The tendency for contemporary GVCs to shift away from the hierarchical governance of large vertically integrated MNEs of the past toward de-integrated networks, often structured around a lead firm, attests to the greater efficiency—that is, featuring relatively lower transaction costs—of these modes for value creation and capture in a globalized environment. Accordingly, the plethora of unique and complex GVC governance modes has resulted in scholars seeking to integrate GVC research with our understanding of internalization theory (e.g., Benito et al., 2019; Narula, 2019; Strange & Humphrey, 2019) and global strategy (e.g., Pananond et al., 2020).

A hidden cost of GVC de-integration becomes evident when unethical practices, involving human rights abuses or environmental damage, occur within distant links of the chain, requiring the strategic efficiency considerations underscoring GVC governance to increasingly incorporate ethical considerations as well (Acquier et al., 2017). Indeed, the preponderance of novel governance relations connecting buyers and suppliers in multi-tier, geographically dispersed supply chains has created challenges for firms when one or more links in the supply chain are beset with unethical practices (Clarke & Boersma, 2017; Gereffi & Lee, 2016; Klassen & Vereecke, 2012; Lund-Thomsen & Lindgreen, 2014). At the same time that increasingly de-integrated GVCs have primarily resulted in a “shrinking” of firm boundaries, growing concerns about the ethical management of vertical supply chains have resulted in expanding “responsibility boundaries” for firms (Amaeshi et al., 2008; Egels-Zandén, 2017), resulting in less overlap between an MNE’s boundaries of control and ownership and its boundaries of responsibility

(Narula, 2019; Narula et al., 2019). Attempts to balance these countervailing pressures for both efficient and ethical GVC governance have focused on preserving the efficiency of de-integrated GVCs through a “cascading compliance model,” whereby lead firms use codes of conduct and monitoring to extend their boundaries of control over suppliers without altering their boundaries of ownership—that is, through *quasi*-internalization rather than internalization (Narula, 2019; Van Assche & Narula, 2023). Moreover, negative externalities within GVCs can sometimes result in public policy changes that institutionalize these expanded responsibility boundaries when firms do not possess adequate awareness, motivation, and/or capabilities to address these externalities themselves (Buckley & Liesch, 2023).

These dynamics, which involve conflicting pressures to maintain the lowest transaction costs (efficiency pressures), address negative externalities (ethical pressures), and abide by regulatory policies (institutional pressures), raise important questions about how these pressures affect the strategic changes individual firms make to value chain governance as they strive to simultaneously balance these various considerations. Specifically, how do firms' considerations of these conflicting pressures result in changes in the strategic governance of the GVC, altering the extent of overlap between the expanding boundaries of responsibility and those of a firm's control and ownership? Furthermore, how does the structure of the GVC itself—and the efficiency imperatives that gave rise to that structure *and* the social and environmental abuses therein—inform managers' strategic decisions about what form of governance will actually address unethical practices within the GVC?

To consider the interplay of these various macro-level pressures and how they manifest in firm-level changes in strategy over time, I employ a case-based process study within the context of an ethically-problematic global value chain: specifically, I consider the three, US-based manufacturers of tantalum capacitors, within the digital electronics global value chain, which became linked to the unethical sourcing of tantalum as a “conflict mineral” from the Democratic Republic of the Congo (DRC) (USGS, 2017b). These cases are theoretically suited to explore this question, since the focal firms were found to be faced with essentially the same efficiency, ethical, and institutional pressures arising in the supply chain for tantalum and yet implemented different strategies involved in altering the industry-wide structure of the GVC (e.g., vertical integration, collaboration, compliance). By comparing across these cases and making sense of their respective decisions within the wider industry and institutional context, I can distill the interplay of efficiency, ethical, and institutional pressures which affected how firms strategically reshape the governance of GVCs with the partial aim of addressing unethical practices in distant linkages of the chain.

From my case study, I discern processes by which unethical practices within a GVC, resulting from the chain-wide drive for greater efficiency, are structurally embedded in a manner that hinders amelioration of those practices—that is, GVC structural inertia limits the efficacy of compliance models that do not substantially alter the structure itself. Instead, owing to expanding responsibility boundaries in spite of narrow boundaries of ownership and control, government regulatory policies are ultimately enacted to institutionalize responsibility across the entire GVC and enhance the awareness and motivation for individual firms to implement strategic changes to GVC governance tending toward greater internalization of responsibility boundaries. Changes to GVC structure, then, are observed to follow changes in individual firm strategy, the latter being motivated by the institutionalization of industry-wide responsibility in the context of a GVC that structurally limits the efficacy of quasi-internalized approaches (e.g., cascading compliance) attempting to preserve, rather than alter, the GVC's efficient but inherently problematic design. Some of the specific features of the GVC explored in this



study—including the dispersion of responsibility across a relatively large number of “lead firms,” the existence of a mid-chain bottleneck functioning as a barrier to “cascading compliance,” and the unavoidability of low-cost value chain inputs inextricably linked to unethical practices—challenge established expectations of how the governance of GVCs can maintain an efficiency-driven structure while simultaneously addressing negative externalities therein. Instead of asking how MNEs can preserve the GVC structure by attempting to extend their boundaries of control (but *not* ownership) to align with expanding boundaries of responsibility, this study insists that we ask how MNEs can internalize responsibility through the strategic restructuring of GVC governance that, perhaps at a cost to efficiency, actually ameliorates unethical practices and satisfies social and institutional imperatives.

Accordingly, in addition to exploring how firm global strategy and GVC structure are related (i.e., Pananond et al., 2020) and specifically identifying how GVC structures can inhibit “cascading compliance” and, therefore, demand strategic value chain restructuring through internalization, these findings build on Buckley and Liesch (2023) by highlighting how the introduction of public policy influences the decisions of individual firms to implement strategic initiatives to address negative externalities in the GVC. The expansion of responsibility boundaries institutionalized through a change in public policy created a collective action problem that opened up a space for individual firms to create and capture transactional value through increasing value chain integration. A practical implication for managers of individual firms within the GVC, including mid-tier suppliers, suggests that they must identify the inherent structural flaws within their GVCs and may enact strategic initiatives that spearhead changes to GVC structure (i.e., internalization) to capitalize on increasing chain-wide responsibility; moreover, managers can engage in political global strategies to encourage the adoption of country-level policies that institutionalize these expanded responsibility boundaries and motivates individual firm actions by enhancing the value of such strategies (Benito et al., 2022).

2 | GLOBAL VALUE CHAINS AND RESPONSIBILITY BOUNDARIES

The primary rationale underpinning the governance of GVCs is based on a transaction costs logic (e.g., Williamson, 1973, 1975, 1979, 2008), combined with the power dynamics of specific firms within the chain for coordinating how buyer–supplier relations are governed (Gereffi et al., 2005). The de-integration of the GVCs for specific industries over time has been driven by the relatively higher costs associated with hierarchical governance compared to market- or network-based governance modes (e.g., Hennart, 1993), which can function more efficiently through institutional and relational mechanisms external to the firm (Gereffi et al., 2005; Kano, 2018; Kano et al., 2020). For example, the global electronics industry shifted from being dominated by large, vertically integrated firms such as AT&T and RCA to having a modular structure, wherein a few large contractors and many component suppliers carried out the manufacturing activities for the lead firms (Gereffi et al., 2005).

The narrowing of firm ownership boundaries and alteration of control boundaries that accompanied the de-integration of GVCs comes with an unexpected consequence when unethical practices are discovered and responsibility for those practices comes to encompass multiple value chain links (Narula, 2019; Narula et al., 2019). Because efficiency considerations resulted in the structuring of GVCs around network-based—rather than hierarchy-based—governance modes, the literature exploring solutions to ethical concerns within globally

complex supply chains has tended to focus on strategies that preserve these more de-integrated GVC structures (Short et al., 2016), including: industry-wide codes of conduct (e.g. Short et al., 2016); monitoring and due diligence (e.g. Hofmann et al., 2018); and various forms of collaboration (e.g. Vurro et al., 2009). Moreover, specifically in regard to labor standards, Narula et al. (2019) argues that a situation requiring full-chain compliance in line with ethical practices may tend toward more vertical integration within the GVC, but only insofar as the potential reputational costs of non-compliance outweigh the high monitoring and enforcement costs associated with compliance—a rare circumstance given how costly monitoring and enforcement is within de-integrated, multi-tier value chains. Accordingly, when responsibility increasingly encompasses the full span of the GVC, a more feasible solution that again maintains the de-integrated structure of the value chain is a “cascading responsibility model” (Narula, 2019), even if the complex and varied structures of certain supply chains, as in the case explored here, can render such approaches less successful at addressing the underlying ethical concerns (e.g., Kim & Davis, 2016).

Given the high compliance costs when ethical responsibility comes to include an entire GVC and the desire to maintain the efficiency-driven GVC structure, it is not surprising to find the tendency for collaborative, industry-wide solutions to become the dominant approach; however, such dispersed responsibility, while intended to promote collective amelioration of the ethical concerns, can have the adverse effect of creating a collective action problem (e.g., Maitland, 1985; Olson, 1965), which opens up space for individual firms to strategize to their advantage. Recent scholarly efforts to integrate the GVC and global strategy literatures argue for a more careful consideration of the interplay between a firm's position in the GVC and its development and implementation of global strategies (Pananond et al., 2020). Additionally, whether firms take the initiative, apart from regulatory requirements, to make strategic changes to address negative externalities in the value chain has been explored as a function of their awareness, motivation, and capability (Buckley & Liesch, 2023). Missing from prior research are studies that consider these multiple dynamics in their totality, to systematically observe how commonly experienced manifestations of efficiency, ethical, and institutional pressures affect firms' decisions about the strategic governance of their GVC. The case-based process study introduced below seeks to explore this intersection between GVC and global strategy research, in a context wherein the traditional efficiency considerations determining GVC structure must increasingly account for social pressures and policy changes driving the expansion (and institutionalization) of responsibility boundaries for individual firms across the entire GVC.

3 | METHOD AND SOURCES

Following insights from Buckley and Liesch (2023), the decision for firms within a GVC to address negative externalities depends upon their awareness, motivation, and capabilities (A-M-C) to do so. Importantly, they also emphasize how public policy interventions can affect the extent of a firm's awareness, motivation, and capability to act. Implicit in the A-M-C framework is the importance of the across-time dimension; indeed, as Buckley and Liesch (2023, p. 433) explain, “[t]he components of A-M-C possibly influence each other through time, such that awareness may lead to subsequent investment in capabilities.” Accordingly, my investigation of the strategic responses of individual firms to negative externalities in the GVC involves considering the dynamic processes by which various external pressures, including the



institutionalization of responsibility boundaries through public policy, can interact to change a firm's (and the wider industry's) awareness, motivation, and capabilities in ways that lead to strategic changes in GVC governance.

3.1 | Contextualized explanation: A case-based process study

To explore these dynamics, I conduct a case-study analysis of select firms within the digital electronics GVC, which featured the unethical sourcing of tantalum—a mineral used to manufacture essential components for digital electronics and an identified “conflict mineral” fueling war and abusive labor practices in the Democratic Republic of Congo (DRC) from the late 1990s to the present. Case studies have long served the purpose of generating novel theoretical insights for underexplored areas, and, within the realm of IB research, Welch et al. (2011, 2022) specifically advocate for case studies that provide contextualized explanations, typically involving the identification of causal mechanisms in which context is integrated rather than abstracted away. Research on GVCs must necessarily follow a contextualized approach, with theory complementing, rather than substituting for, “the rich detail and complexity that can be observed in global value chains, especially their historical, geographical, and sectoral specificity” (Gereffi et al., 2005, p. 100).

One type of case research that is generative of such contextualized explanations is process research (Welch et al., 2022), which can reveal “unexpected and largely uncontrollable chains of activity and events in which actors, environments, and organizations are all in constant and mutually interacting flux” (Langley et al., 2013, p. 5). In this study, the changing circumstances around the unethical extraction of tantalum fueling conflict and human rights abuses in the DRC, which ultimately involved the implementation of policies that mandated reporting of mineral sourcing, represent the inseparable context within which the strategic actions of the focal firms concerning their governance of the GVC can be understood. To achieve this contextualization, I employ temporal bracketing to decompose the timeline of macro-level events into contextually meaningful periods, structured around theoretically derived constructs (e.g., Decker, 2022), which shaped the decisions and outcomes of different actors over time (Langley, 1999). The across-time approach this study employs also sets it apart from most other research on ethics and organizations, which have overwhelmingly been cross-sectional in nature (McLeod et al., 2016).

3.2 | Documentary evidence

Another unique feature of this case study is the reliance on documentary evidence to construct a narrative involving the strategic changes to GVC governance carried out by individual firms in response to efficiency, ethical, and institutional pressures. The use of a diverse array of sources—including corporate annual reports and press releases, industry-wide reports and periodicals, United Nations studies of human rights abuses, and US government documents—allows for the investigation of multi-level dynamics across time (e.g., Kipping et al., 2014; Yates, 2014), specifically how macro-level events affect the awareness, motivation, and capabilities of focal firms as they make strategic decisions around value chain governance. These strategic decisions, which range from vertical and horizontal acquisitions to the formation of

intra-industry alliances to the adoption of codes of ethics, are then reflected in the mandated reporting in public corporate documents.

Importantly, the sources used in this study are analyzed for their reliability and understood within the context of their creation (Lipartito, 2014). Corporate annual reports are particularly valuable for being public, outward-facing documents that follow certain conventions and are consistently produced every year. Because of this consistency (e.g., Pant & Ramachandran, 2017) and the systematic patterns in reporting found in prior studies about impression management (e.g., Clapham & Schwenk, 1991) and ethical framing (e.g., Loughran et al., 2009), these documents provide regular snapshots that combine, on the one hand, objective information such as a firm's sales across different product lines, the location of its manufacturing plants globally, and legal actions taken by the firm, and, on the other hand, subjective information such as a firm's claims about social responsibility and explanations for specific financial outcomes or strategic decisions. Contextualizing these documents within the wider occurrence of events allows for the interpretation of what firms report—as well as the “silences” in their reporting (i.e., Decker, 2013).

3.3 | Case selection: Tantalum capacitor manufacturers

In addition to utilizing source materials allowing for consistency across time, this study also features deliberate case selection to account for the geographic and sectoral specificity of global value chain dynamics (e.g., Gereffi et al., 2005), since the strategic responses of firms depend heavily on their position in the GVC, the overall structure of the GVC, and the institutional characteristics of their external environment. Accordingly, this case study is comparative in design, specifically looking at the three largest manufacturers of tantalum capacitors within the global value chain for the digital electronics industry. Indeed, by virtue of being headquartered in the same home country (i.e., the United States) and occupying the same position within the GVC, each of the three cases experienced similar efficiency, ethical, and institutional pressures through a series of shared events. Along the same timeline, each of the firms faced tantalum price volatility and contractual hold-up problems with their immediate supplier (efficiency), the growing awareness of unethical sourcing of tantalum as a “conflict mineral” from the DRC (ethics), and the introduction of legal mechanisms by the US Congress that expanded responsibility for those unethical practices across the GVC (institutions).

As explained above, these shared events form the structure of the narrative within which I make sense of the strategic decisions of the three manufacturing companies. This approach allows for the preservation of context by interpreting firm decisions as responses to events that are presented, not as discrete “data-points” (as in event-study analysis), but rather occurrences with meanings shaped by the past and future (Suddaby et al., 2014). Moreover, these events were understood with reference to theoretical constructs relevant to this study, namely the efficiency, ethical, and institutional imperatives facing the firms as they experienced the unfolding of the same events. In this way, I can discern the longitudinal processes by which commonly experienced events affected the awareness, motivation, and capabilities of firms to strategically respond to external pressures, in order to uncover sources of variation in those responses. Figure 1 depicts these shared events along the timeline, alongside key features of the volatile context in the DRC wherein conflict and associated human rights abuses came to characterize the extraction of tantalum as part of the GVC for the digital electronics industry.

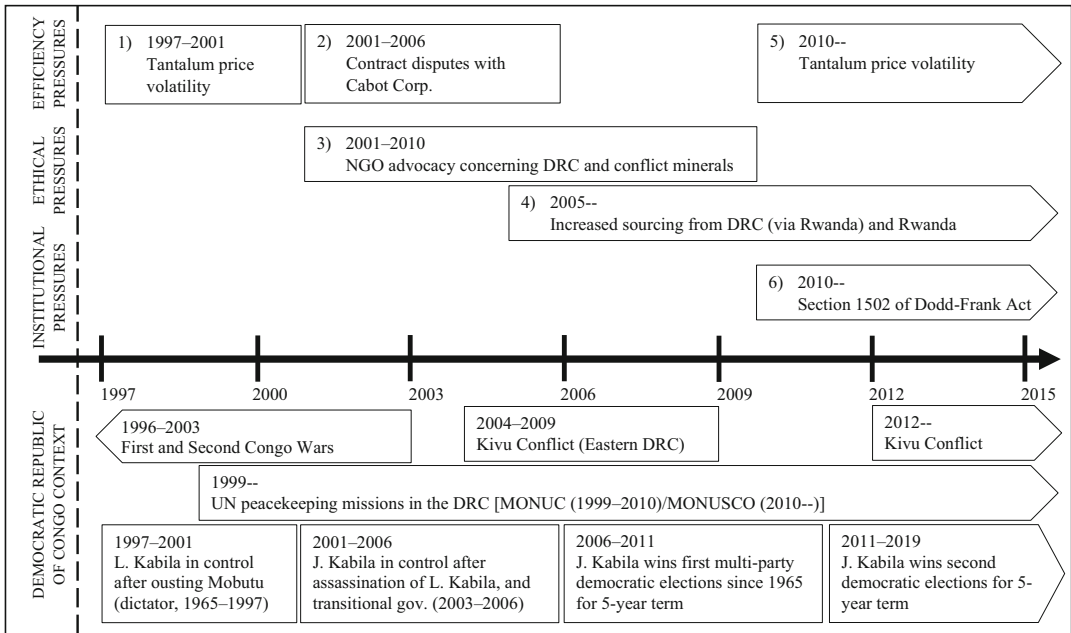


FIGURE 1 Timeline with shared events and the DRC context.

The construction of a process narrative for this study is structured around these shared events, which are presented through a demarcation of periods grouped around theoretical constructs particular to the argument rather than through a strict chronology (Decker, 2022). Accordingly, the next sections proceed as follows: first, I provide details about the overall context, including information about tantalum, the supply chain for tantalum within the digital electronics industry, and the three focal firms within the GVC; next, I proceed to elaborate the key event-periods along a timeline structured around the efficiency, ethical, and institutional pressures facing each firm and their respective responses to those pressures; and, lastly, I explore the divergence of strategic responses by each of the firms with reference to the interplay between these pressures, the firms' global value chain positioning, and the awareness, motivation, and capabilities to implement strategic changes.

4 | THE DIGITAL ELECTRONICS GVC AND TANTALUM SUPPLY CHAIN

4.1 | Tantalum

Tantalum is a dark blue-gray metal, most often found together with niobium in nature and combined in different oxide minerals, such as columbite-tantalite (coltan), that need to be separated chemically. The most significant sources of these minerals are found at the Greenbushes and Wodgina mines in Australia, the Tanco mine in Canada, the Volta Grande mine in Brazil, and artisanal mines in the Kibara pegmatite belt in the DRC and Rwanda, with less significant sources in China, Angola, Ethiopia, Mozambique, Russia, and Nigeria (USGS, 2017b). Tantalum's physical properties—hardness, conductivity, and resistance to corrosion—make it an

ideal material for use in a wide variety of electronics; specifically, tantalum capacitors, which benefit from the material's high capacitance within very small volumes, are the leading use of tantalum in space-sensitive products such as cell phones, computer hard drives, and implantable medical devices (USGS, 2017b). An estimated 41% of tantalum is processed into electronics-grade tantalum metal powder for use in tantalum capacitors (Mancheri et al., 2018).

4.2 | Global value chain

Figure 2 depicts the basic links in the tantalum supply chain as incorporated into the GVC for the digital electronics industry, with specific attention (in bold) given to the value chain for tantalum capacitors.

Several characteristics of this value chain carry significant implications that pose challenges for simultaneously achieving both efficient and ethical governance of the GVC. First, tantalum mining is conducted either through large-scale, company-owned mines that are capital intensive and require more sophisticated technologies or through small-scale, artisanal mines that are low cost and need only handheld digging tools (Mancheri et al., 2018); however, without any established market for the trade in tantalum ore, the multi-tier channels facilitating trade (especially from the DRC and Rwanda) tend to obscure the origin of minerals, and ores come to be mixed at the refinery stage. Furthermore, the predominance of Chinese facilities in the processing of ores into refined materials further obscures the origin of minerals, as most of the unaccounted-for tantalum from central Africa is exported to China (Mancheri et al., 2018). Two, with a small number of processors capable of producing capacitor-grade tantalum metal powder and a shrinking number of tantalum capacitor manufacturers as a result of horizontal integration, the value chain features a bottleneck that influences the power dynamics of firms in and around these linkages. Lastly, lacking any clear “lead firm,” the numerous producers of final

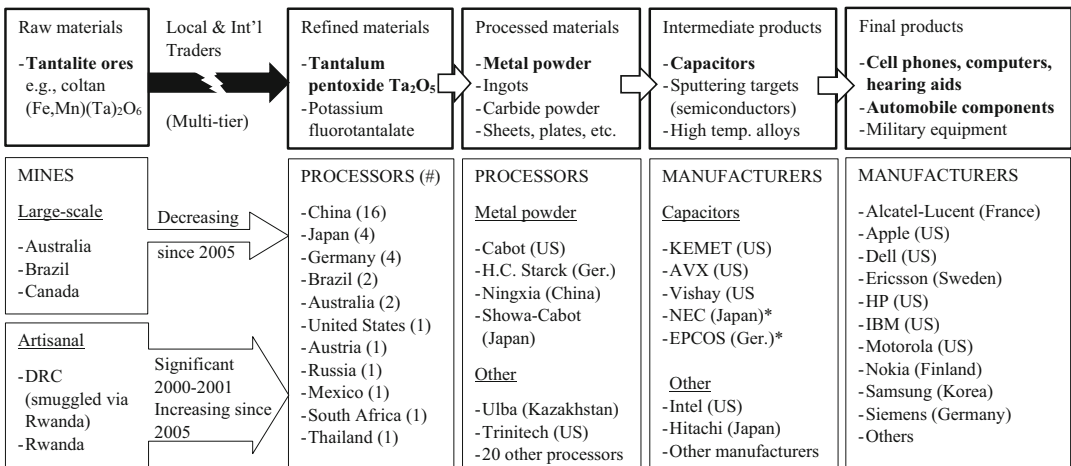


FIGURE 2 Tantalum global value chain (digital electronics industry). *The tantalum capacitor business units of EPCOS and NEC were acquired by KEMET in 2006 and 2012/2013, respectively. Source: Cuvelier and Raeymaekers (2002); Mancheri et al. (2018); USGS (2017b).



products span a range of industries, the full of extent of which cannot be adequately depicted in a small chart, but include some of the largest, most visible digital electronics companies worldwide.

4.3 | Tantalum capacitor manufacturers

The cases selected for this study are the three most significant manufacturers of tantalum capacitors globally: AVX, KEMET, and Vishay Intertechnology. In 2002, these three firms combined held 60.4% of the global market share for tantalum capacitors, split nearly evenly between the three (Passive Component Industry, 2003). Other notable competitors by market share, including NEC (15.4%), EPCOS (4.8%), and Nichicon (4.4%), would subsequently see their tantalum business units acquired by either KEMET or AVX during the years studied (Passive Component Industry, 2003; Zogbi, 2014). The firms are all US-based¹ manufacturers of electronic components, with multiple manufacturing plants primarily located in low-cost countries. Table 1 provides important details about each of the firms, revealing certain similarities and differences.

Notably, while each firm occupies the same position on the value chain for supplying tantalum capacitors to the electronics industry, they differ in their level of diversification, with KEMET less diversified than both AVX and Vishay. Indeed, KEMET has a more focused diversification strategy on capacitors of different types (e.g., tantalum, ceramic, and others). For example, in 1997, roughly 75% of KEMET's production was represented by tantalum and ceramic surface-mount capacitors, with applications for the digital electronics industry (KEMET, 1997). In comparison, AVX and Vishay are both more diversified. For example, while tantalum capacitors make up the largest product category for AVX (25% of revenues in 2003), the firm's sales are otherwise split somewhat evenly across other categories: ceramic capacitors (24%), advanced products (22%), Kyocera-developed products (20%), and connectors (9%) (AVX, 2003). The level of diversification is even more pronounced for Vishay, a firm known for its aggressive acquisition strategy across a range of products in passive components (capacitors, resistors, magnetics) and semiconductors (diodes, transistors, optoelectronics, integrated circuits) (Vishay, 2000). Indeed, by 2005, Vishay's sales were evenly split between passive components and semiconductors, with capacitors as a whole (tantalum, ceramic, and other) constituting a smaller or equal share of sales (20%) compared to semiconductors (30%), resistors (23%), and siliconix (20%) (Vishay, 2005). Though, like capacitors, semiconductors also utilize tantalum.

5 | EFFICIENCY PRESSURES IN THE GLOBAL VALUE CHAIN

5.1 | Tantalum price volatility, 1997–2001 and 2010–2015

All three firms recognized the potential impacts which the volatile market for tantalum powder could have on their profit margins. Forward-looking statements in each firm's annual reporting, though formulaic and obligatory, reveal the concern over their supply of raw materials. For example, KEMET (1997, pp. 28–29) noted how actual and future results could be affected by “difficulties in obtaining raw materials ... the effects of quality deviations in raw materials,

TABLE 1 Description of firms.

FIRM	Founding(s)	Current US headquarters	Tantalum capacitor market entry	Tantalum capacitor plant locations	Product lines (in order of importance)
KEMET Corporation	• 1919 (by Union Carbide)	Simpsonville, SC	License from Sprague (1954)	• Mexico	Tantalum capacitors
	• 1987 (independent)			• United States	Ceramic capacitors
AVX Corporation	• 1922	Myrtle Beach, SC	Acquisitions from STC-MLC and Corning (1987)	• China	Other capacitors
	• (as Radiola, later Aerovox)			• Portugal	
	• 1972			• Czech Republic	Tantalum capacitors
	• (as AVX)			• El Salvador	Ceramic capacitors
Vishay Intertechnology	• 1990 (Kyocera merger)	Malvern, PA	Acquisition of Sprague (1992)	• England	Advanced products
	• 1962 (independent)			• China	Kyocera products
				• Mexico	Connectors
				• Israel	Semiconductors
				• Czech Republic	Resistors/Inductors
				• India	Capacitors (tantalum, etc.)
				• China	Siliconix
					Measurement equipment

Source: AVX (2000, 2004, 2021); KEMET (1997, 2011, 2021); Vishay (2003, 2005, 2021).



particularly tantalum powder ... [and] the effects of significant price increases for tantalum ... or an inability to obtain adequate supplies of tantalum from the limited number of suppliers.” Similarly, given the limited number of tantalum powder suppliers, AVX (2000, p. 27) posed a scenario in which, given “a 10% hypothetical increase in the average cost of tantalum purchased by AVX, gross profit for the year ended March 31, 2000, would have been negatively impacted by approximately \$8.8 million,” which would equate to a 6% decline in the profit margin.

Faced with a lack of control over their tantalum supply but an increasing pressure to reduce production costs, the firms began implementing cost-cutting measures, including the rapid relocation of manufacturing to low-cost regions (AVX, 2000; KEMET, 1999; Vishay, 1999) and alterations to how and how much tantalum is used in production (AVX, 2001; KEMET, 1998). Two of the firms—KEMET and Vishay—unsuccessfully sought to secure some level of control over their tantalum supply: on the one hand, Vishay attempted to establish a JV with China National Non-Ferrous Metals Industry Corporation for the mining, processing, and refining of tantalum in China, for “access to a long-term, stable supply of low-cost tantalum” (Vishay, 1997, p. 23); on the other hand, KEMET entered a JV—called Tantalum Australia—with Australasian Gold Mines “to assure an adequate supply and to mitigate the cost of tantalum” (KEMET, 2001, p. 8). These joint ventures were either never completed, as in the case of Vishay, or terminated after only 1 year, as in the case of KEMET (KEMET, 2002; Vishay, 1998).

In 2000, a sudden explosion in demand in the electronics industry, which, for example, saw growth in the market for computer servers of 50% per quarter and cell phones by 60% for the year (KEMET, 2000), resulted in a roughly 500% increase in the price of tantalum, from an average of about \$50 per pound to \$300 (KEMET, 2001). In particular, the supply shortage for tantalum leading to this price increase was strongly driven by Christmas season demand for Sony’s new Playstation 2 (Smith & Mantz, 2006). Indicative of how serious was the tantalum shortage was the decision by the US Defense Logistics Agency to carry out large sales of tantalum minerals and intermediate forms (metal powder, ingots, etc.) from the US strategic stockpiles: in 2000 and 2001, roughly 80 tons of minerals (valued \$31.2 million), 48 tons of metal powder (\$18.0 million), and 39 tons of metal ingot (\$20 million) were sold into the supply chain, contributing, over the long run, to the depletion of the US stockpile of tantalum below levels capable of stabilizing the market (Department of Defense, 2000, 2001; Mancheri et al., 2018).

The immediate response of each firm to this volatility in tantalum prices was to pass on part of the increased costs to their customers (AVX, 2001; KEMET, 2001; Vishay, 2000). Each firm also entered into long-term supply contracts with Cabot Corporation for the purchase of tantalum metal powder (to be discussed in greater detail in the next sub-section). Vishay, for one, strategically stockpiled tantalum ore in 2000 and early 2001 in anticipation of continued price increases into 2001 (Vishay, 2000). This dramatic instance of volatility also informed some of the actions already detailed above, such as KEMET’s effort to establish a mining JV with Australasian Gold Mines (KEMET, 2001) and AVX’s redesign of components to use less tantalum or alternative materials (AVX, 2001). These efforts notwithstanding, the potential volatility of tantalum prices remained a serious concern for the three firms. Indeed, even after prices had temporarily stabilized, KEMET continued “exploring various alternative sources of supply to ensure a supply of tantalum at reasonable prices” (KEMET, 2001, p. 18), and, as seen in Figure 3, prices began to rise once again after 2010, adding pressure for the firms to find ways to procure their supply of tantalum more efficiently.

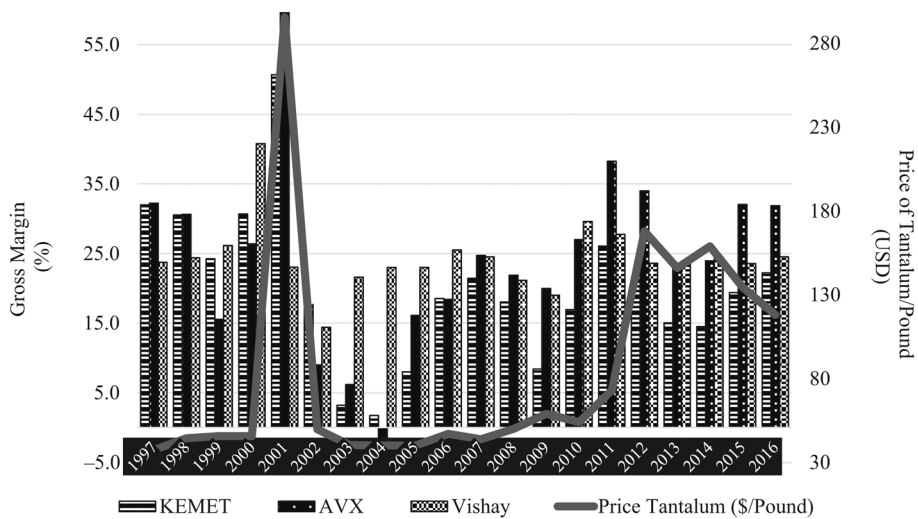


FIGURE 3 Firms' gross margins compared to price of tantalum, 1997–2016.

5.2 | Contract disputes with Cabot Corporation, 2001–2006

In the context of the extremely high tantalum prices of the year 2000, each of the three firms entered into long-term purchase agreements with Cabot Corporation, one of three processors capable of producing the tantalum metal powder necessary for capacitors and the only one headquartered in the United States. The terms of the initial contracts were similar for the three firms: each was to last from 3 to 5 years and required that the firms purchase certain amounts of tantalum powder from Cabot at prices fixed for at least part of the duration of the contract (e.g., 2 years) and based upon the high price levels experienced in 2000 (AVX, 2001; KEMET, 2002; Vishay, 2001). When the tantalum prices peaked in December 2000 and subsequently fell to previous levels in 2001, the high tantalum prices fixed by the contracts forced the three capacitor manufacturers into litigation with Cabot, subsequent renegotiations over the contracts, and significant inventory and future purchase losses for each firm.

Both KEMET and Vishay settled the legal disputes with Cabot rather quickly and opted for renegotiation of the contracts. For Vishay, the modifications to the contract included reductions in prices conditioned upon the extension of the contract and the regular scheduling of purchase commitments (Vishay, 2002). For KEMET, a similar extension of the contract came with the possibility of price reductions based on market prices if certain regular purchase commitments were met (KEMET, 2003). In contrast to KEMET and Vishay, AVX persisted over several years with its litigation against Cabot, filing multiple lawsuits. First, in a 2002 lawsuit alleging “unfair and deceptive trade practices by Cabot, [and] breach of contract,” AVX claimed that Cabot took advantage of the tantalum shortage to induce AVX into the long-term contract at unfavorable prices (AVX, 2004). A second lawsuit followed in 2004 with regards to the same contracts, alleging that Cabot was in violation of anti-trust laws (AVX, 2004). A third lawsuit in 2005 alleged that Cabot failed to abide by the contract's “most favored nations” clause (AVX, 2006). All cases were settled in 2009, several years after the terms of the contracts subject to the litigations had ended (Cabot, 2009).

TABLE 2 Tantalum raw material losses (in millions).

Year	Losses	KEMET	AVX	Vishay
2001	Inventory write-down	\$0	\$0	\$52
	Future purchase losses/(gains)	\$0	\$0	\$0
	= Total [% of revenues]	\$0 [0%]	\$0 [0%]	\$52 [3.1%]
2002	Inventory write-down	\$0	\$0	\$25.7
	Future purchase losses/(gains)	\$0	\$0	\$106
	= Total [% of revenues]	\$0 [0%]	\$0 [0%]	\$131.7 [7.2%]
2003	Inventory write-down	\$16.4	\$0	\$5.4
	Future purchase losses/(gains)	\$24.4	\$0	\$11.4
	= Total [% of revenues]	\$40.8 [9.1%]	\$0 [0%]	\$16.8 [0.77%]
2004	Inventory write-down	\$0	\$48.2	\$0
	Future purchase losses/(gains)	\$12.4	\$39.4	\$16.2
	= Total [% of revenues]	\$12.4 [2.9%]	\$87.6 [7.7%]	\$16.2 [0.67%]
2005	Inventory write-down	\$0	\$0	\$0
	Future purchase losses/(gains)	\$(11.8) ^a	\$0	\$(1) ^a
	= Total [% of revenues]	\$(11.8) [(2.8%)]	\$0 [0%]	\$(1) [(0.04%)]
2006	Inventory write-down	\$0	\$0	\$9.6
	Future purchase losses/(gains)	\$0	\$0	\$5.7
	= Total [% of revenues]	\$0 [0%]	\$0 [0%]	\$15.3 [0.59%]

^aReversal of previous write-downs having met contractual conditions with Cabot.

Source: AVX (2004); KEMET (2003–2005); Vishay (2001–2006).

For all three firms, the purchase of “overpriced” tantalum powder from Cabot necessitated by the long-term contracts resulted in significant losses, with write-downs on current inventories and future purchases reducing each firm’s gross profit margins. Table 2 summarizes these losses. Despite differences in the manner in which each firm accounted for these losses, the overall impact of these losses is seen to be roughly equivalent relative to each firm’s net revenues. Following the conclusion of each firm’s contractual obligations with Cabot in 2006, the strategy of using long-term supply contracts was replaced with short-term contracts, forecasting needs in terms of months rather than years (KEMET, 2007; Vishay, 2009) and relying for several years on tantalum stockpiled as a result of the contractually required purchases (Vishay, 2006, 2007, 2008).

6 | ETHICAL PRESSURES IN THE GLOBAL VALUE CHAIN

6.1 | NGO and public advocacy concerning the DRC and “conflict minerals,” 2001–2010

At around the same time tantalum prices were fluctuating dramatically in late 2000, awareness began to grow about how the illegal exports of natural resources such as tantalum from the

DRC were funding the military engagements of local and foreign-backed militias in the country. Beginning in 1996 as a spillover of the Rwandan genocide, the Congo Wars—also known as “Africa’s World War”—combined civil conflict with regional and international geopolitics, resulting in the deaths and displacement of millions of Congolese (French, 2004; Prunier, 2009; Renton et al., 2007). The fluctuation of tantalum prices has been found to directly contribute to the increase and decrease of violence in the DRC, particularly its eastern regions of North and South Kivu where most of the tantalum ore is artisanally mined (Smith & Mantz, 2006). Launched in 1999 during the middle of the Congo Wars (1997–2003), the UN mission to the DRC (MONUC) issued reports from its panel of experts on the illegal exploitation of natural resources in 2001 and 2002, finding that “no coltan exits from the eastern Democratic Republic of the Congo without benefiting either the rebel group or foreign armies” (UN Panel of Experts, 2002a).

In addition to detailing the supply chain for conflict tantalum, the reports also named specific companies, including the largest processors (Cabot and H.C. Starck) and two of the three capacitor manufacturers (Vishay and KEMET), as possibly being in contravention of OECD guidelines for multinational enterprises for their purchases of illegally smuggled tantalum associated with the war (UN Panel of Experts, 2002a). Both H.C. Starck and KEMET responded to the panel’s assertions, and the panel subsequently found H.C. Starck had been misled by its supplier about the origin of the coltan purchased and KEMET had been proactively responding “to earlier reports on activities in the DRC” (UN Panel of Experts, 2002b). Neither Cabot nor Vishay responded to the initial UN report, and AVX is not mentioned.

Following the conclusion of the Congo Wars in 2003, the UN mission persisted and turned its attention to the Kivu conflict in the eastern DRC (2004–2009), which was directly related to the increasing dominance of unaccounted tantalum from the DRC in the supply chain (discussed in the subsequent section). The UN Group of Experts reports (2008, 2010) presented findings about the convergence of conflicts between different militia groups, the control of artisanal mines employing forced labor, and the export of smuggled DRC coltan through neighboring Rwanda and Uganda. These reports recommend that responsibility for transparency in the tantalum supply chain should rest on private companies, a suggestion endorsed by officials from countries like Belgium, the UK, and Germany responding to UN inquiries. Knowledge of the linkages between conflict and exploitative labor practices in the DRC and consumer electronics such as cell phones spurred increasing NGO and public advocacy, from the reporting of Human Rights Watch, the Enough Project, and Amnesty International, to celebrity activism (Smith & Mantz, 2006).

Indicative of the three firms’ response to the pressures from NGO and public advocacy is the inclusion, from 2004 to 2011, of a perfunctory note in AVX’s annual reports: “We have informed our suppliers of tantalum materials not to use material sourced from the Democratic Republic of the Congo due to environmental, wildlife, and humanitarian concerns, and to our knowledge we have not used an material from that location” (AVX, 2004, p. 6). Neither Vishay nor KEMET mention the DRC or conflict minerals in their annual reporting, until 2010 and 2011 respectively. Having no ability to monitor the sources from which their immediate suppliers acquired their tantalum, the firms had no capability to know how much of the tantalum they purchased had originated in the DRC. Moreover, the growing awareness of unethically sourced tantalum within the digital electronics supply chain did not translate into increased motivation for these firms to take significant action.



6.2 | Increased sourcing from DRC (via Rwanda) and Rwanda, from 2005

Instead, despite the growing awareness of “conflict minerals” from the DRC, tantalum sourced from the region became more, rather than less, dominant in the supply chain, as the GVC shifted its sourcing from the high-cost mines in Australia, Canada, and Brazil to the low-cost artisanal mining in war-torn DRC. While this dominance was also evident during the Congo Wars, peaking during the height of demand in 2000, it was during the Kivu conflicts (2004–2009, 2012 to –) when unaccounted for tantalum from central African artisanal mines began to replace the large-scale mines in Australia and Canada (Mancheri et al., 2018). Both as a result of the global financial crisis of 2008 and the increase in low-cost tantalum from the DRC (via Rwanda), large-scale mines like the Wodgina mine operated by Global Advanced Metals in Australia and the Tanco mine operated by Cabot in Canada were placed on care of maintenance at the end of 2008 (Mancheri et al., 2018; Passive Component Industry, 2011). By 2014, an estimated 80% of the world’s tantalum supply originated in central Africa, the majority of this being unaccounted-for minerals from the DRC exported via Rwanda; indeed, of the roughly 2200 tons being exported from Rwanda in 2014, only 27% is thought to be produced from mines in Rwanda with the remainder smuggled illegally across the DRC-Rwanda border (Mancheri et al., 2018; Montague, 2002).

Coupled with the growing awareness of the increasing prevalence of such unethical supply chain practices, actions within the industry-wide GVC tended to begin with final product manufacturers, rather than the upstream suppliers of tantalum powder or intermediate components. In 2004, the Electronic Industry Citizenship Coalition (EICC) was founded by a group of 8 firms—for example, Dell, HP, and IBM—to address growing responsibility concerns in the electronic supply chain, generating a Code of Conduct which firms could adopt and growing in membership to over 40 companies by the summer of 2008 (EICC, 2008). The early initiatives of the EICC bypassed the intermediate suppliers and focused instead on certifying the processors of tantalum minerals, introducing the Conflict-Free Smelters Initiative (CFSI) whereby processors could be certified as conflict-free and downstream buyers would be encouraged to purchase only from certified suppliers (EICC, 2010). Of the three firms, KEMET is the first to apparently adopt the EICC Code of Conduct and begin cooperating with the efforts to create a more responsible supply chain for tantalum and other metals, though they did not become a member (KEMET, 2009). Vishay subsequently became a member of the EICC in 2011 (EICC, 2011).

7 | INSTITUTIONAL PRESSURES IN THE GLOBAL VALUE CHAIN

7.1 | Passage and implementation of Section 1502 of the Dodd-Frank Act, from 2010

After the passage of Section 1502 in the 2010 Dodd-Frank Act, actions toward greater responsibility taken by the three firms (and other US-based firms across the GVC) are viewed as primarily responsive to the new requirements laid out by the legislation. The Act represents a formal recognition of the expanding “responsibility boundaries” for firms across the GVC, following the mounting pressure from governmental and non-governmental organizations for increased responsibility already mentioned. Specifically, Section 1502 mandates that firms publicly-traded

in the US for whom certain materials (tantalum, tin, tungsten, gold) are “necessary to the functionality or production” of products they manufacture must report on the due diligence efforts they conduct regarding whether they source those materials from the DRC or neighboring countries (SEC, 2017).

The early initiatives by the larger, final product manufacturers, such as the creation of the EICC, are indicative of the greater pressure being placed on these large, highly visible firms to address the issue of “conflict minerals.” Celebrity activism (e.g., ABC News, 2012; Pilkington, 2016), popular media, and human rights NGOs focused their campaigns on the producers of visible consumer products, such as cell phones and laptop computers, with documentary films like *Blood in the Mobile* attempting to show the link between mobile phones and the DRC conflict (Applebaum, 2011). These efforts resulted in the industry’s lead firms such as Apple, Intel, and HP to take the initiative to comply with the new legislation, though struggling to establish supply routes avoiding the DRC or to carry out due diligence to successfully determine whether or not the components they purchase from their suppliers are conflict free (Chasan, 2015; Maylie, 2011).

7.2 | Changes in GVC governance by the tantalum capacitor manufacturers

By law, each of the three manufacturers of tantalum capacitors was required to respond. Immediately, each firm recognized the significant economic and social burdens which adequate compliance with the law could have on their operations. For example, Vishay noted how “the determination that any raw materials used in our products are conflict minerals originating from the Democratic Republic of the Congo could increase the probability that we will ... incur additional expenses to comply with government regulations, and face public scrutiny” (Vishay, 2010, p. 68). AVX (2011, p. 14) expressed similar concerns:

If the rules are adopted as proposed, in order to be able to accurately report our compliance with Section 1502, we may have to perform supply chain due diligence, third-party verification and possibly private sector audits on the sources of these metals—all the way down to the mine of origin. Globally supply chains are complicated, with multiple layers and suppliers between the mine and the final product. Accordingly, we could incur significant cost related to the compliance process. While the impact of Section 1502 on our business is uncertain at this time, we could potentially have difficulty in procuring needed materials and in satisfying the final disclosure requirements when finalized by the SEC.

However, in subsequent years, there was a significant divergence in the responses of the three firms. Figure 4 depicts the vertical and horizontal integration of the three firms over time, revealing in particular the varied degree of value chain internalization carried out by each following 2010.

KEMET was the most aggressive in their response, deciding to implement a strategy of backwards vertical integration both to stabilize their raw materials costs and ensure the conflict-free status of their tantalum capacitors (KEMET, 2012). Through an exclusive partnership with Kisengo mine for conflict-free tantalum ore, an agreement with Tantalite Resources to refine that ore, the internal development of at KEMET’s Mexico plant for the product of potassium

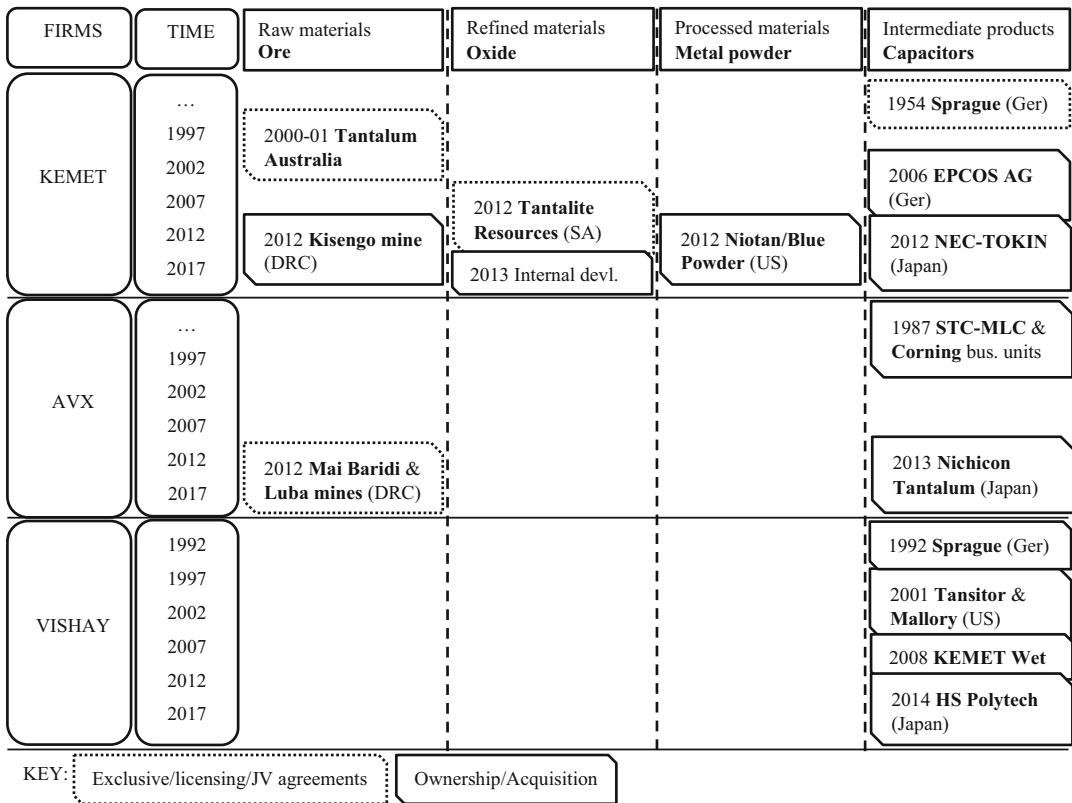


FIGURE 4 Vertical and horizontal integration of the tantalum capacitor manufacturers: KEMET, AVX, VISHAY. *Source:* AVX (2013, 2021); KEMET (2000, 2007, 2013, 2021); Vishay (2001, 2008, 2014); Zogbi (2014).

fluorotantalate, and the acquisition of Niotan (renamed KEMET Blue Powder) for the processing of capacitor-grade powder, KEMET was able to claim “the only closed pipe, vertically integrated conflict-free supply chain,” becoming one of only six firms filing a Conflict Minerals Report to the SEC by 2015 (KEMET, 2015). KEMET’s CEO, Per-Olaf Lööf, spoke in support of the Dodd-Frank Act during a congressional hearing, in which he outlined the rationales for this strategy:

Our investment has reduced some extreme fluctuation in ore and powder pricing in our former supply model. Being one of the largest tantalum users in the world, I believe our initiative has stabilized the pricing of this material not just for us but for the industry at large ... It is possible to succeed in business while being economically and socially responsible. Section 1502 has been very good for the tantalum industry. There is little question on provenance and there is a clear road map how to ethically source DRC tantalum. The Dodd-Frank Act has helped companies like KEMET to again, after decades of absence, be able to embrace the DRC and develop a competitive and secure supply chain, while also, of course, improving lives of people in [Kisengo] village (US Congressional Hearing, 2015).

The response of AVX centered around a joint partnership called “Solutions for Hope,” spearheaded by Motorola Solutions in 2011 and involving a group of firms sourcing from the Mai Baridi and Luba mines in the DRC’s conflict-free Katanga province (AVX, 2012). The project as a whole was designed as a closed-pipe supply chain, from the certified mines through a designated set of processors, component manufacturers, and final product manufacturers. In this way, AVX has avoided having to internalize processor steps of the value chain through a collaborative governance structure that combines upstream linkages to the source of tantalum and downstream linkages to final product manufacturers.

The response of Vishay followed a compliance approach, engaging in due diligence and industry cooperation by joining the EICC in 2011 (as noted above) (Vishay, 2013). By 2014, the firm reported that it was “working toward the elimination of materials that directly or indirectly benefit armed groups in the DRC or adjoining countries from our supply chain” (Vishay, 2014, p. 13). This cooperative approach reflects the most common response of firms in the electronics industry at large, as evidenced by Kim and Davis’ (2016) findings regarding the Conflict Minerals Reports submitted by firms to the SEC.

8 | EXPANDING RESPONSIBILITY AND STRATEGIC INTEGRATION OF THE GVC

The above case study reveals a series of processes by which various external pressures, including those to achieve the lowest supply costs (efficiency), address human rights abuses in the value chain (ethics), and comply with responsibility-expanding regulations (institutions), interacted to drive individual firms to make strategic changes in GVC governance. The exploration of these processes satisfies, as suggested by Pananond et al. (2020), the need to consider how firm-level strategic actions, which are dynamic and adaptable, can influence macro-level GVC policy, which tends to be viewed as a static, immutable structure.

8.1 | GVC structural inertia and the limits of cascading compliance

Indeed, because the structure of a specific GVC is driven by efficiency considerations, significant changes in GVC governance would only be expected to occur when such changes result in a more efficient structure. For example, in the case of tantalum sourcing within the digital electronics GVC, the shift from the large-scale, capital-intensive mines in Australia and Canada to the small-scale, low-cost artisanal mines of the DRC resulted from the lower cost with which tantalum from the DRC could be extracted—a gain in efficiency that is largely *because of* the unethical practices surrounding its extraction. In this way, what may be deemed as “negative externalities” of efficiency-driven GVC structures are, in actuality, not an unfortunate byproduct, but rather an unavoidable, internalized feature of the GVC structure itself. Hence, even when awareness of upstream unethical practices results in pressures for change, the pressure to maintain the efficient structure tends towards models that preserve existing governance relations, such as “cascading compliance” (e.g., Narula, 2019; Van Assche & Narula, 2023). Recent research points to significant problems with the cascading compliance model, noting the increased likelihood of suppliers evading compliance, the reproduction of inequalities within the value chain, and the growing transactions costs with each tier of the



GVC, especially owing to the larger number of upstream suppliers in most value chains (Soundararajan, 2023; Van Assche & Narula, 2023).

Given GVC structural inertia, which would tend to preserve the unethical value chain practices that contribute to greater efficiency, there arises a necessity to analyze the specific structural characteristics of the GVC to identify the barriers to full-chain compliance, so as to determine what is needed to overcome those barriers. In the case of the digital electronic GVC explored above, for example, the mid-chain bottleneck created by the small number of tantalum powder suppliers functioned not only as a source of contractual problems for the manufacturers of tantalum capacitors but also as an obstacle to cascading compliance. This example demonstrates how the small numbers problem germane to transaction costs economics (e.g., Williamson, 1975) can be as significant a barrier to cascading compliance as large number of difficult-to-monitor upstream suppliers, since a small number of suppliers, if unwilling to take significant steps toward compliance, will hinder the efforts of downstream firms to ameliorate upstream practices. Accordingly, any attempt to address unethical practices within the GVC would require circumventing this bottleneck. Moreover, because of the opacity of the supply chain for tantalum, any efforts short of directly monitoring mining operations in the DRC at the source of extraction would fail to meet the growing expectations in line with expanded (and, then, institutionalized) responsibility boundaries.

The identification of GVC structural inertia as both the source of unethical value chain practices and the obstacle to their amelioration directs scholars and managers alike toward a different set of questions from what prevailing quasi-internalization models, such as cascading compliance, have asked. Indeed, rather than ask how unethical value chain practices can be mitigated without substantially changing the GVC structure, we need to ask which parts of the structure are inherently flawed and in need of restructuring, perhaps through internalization of firm boundaries that more closely align with responsibility boundaries and, more likely than not, in ways counter to the most efficient governance of the GVC. Such a question directly challenges the prevailing efficiency-driven rationale for GVC governance, which, though in a sense ethically neutral, likely tends toward unethical practices when involving global locations where human rights standards are not adequately maintained.

8.2 | The institutionalization of responsibility boundaries and GVC structural changes

Ultimately, in the face of GVC structural inertia, any structural changes to a GVC will result from strategic changes initiated by individual firms, sufficiently motivated to invest in the capabilities to alter the GVC structure against the grain of a pure efficiency logic. The extent of inertia within the digital electronics GVC, for example, necessitated shifts in where the boundaries of responsibility were understood to exist within the GVC to amplify awareness and spur motivation of individual firms to take significant steps—that is, once the responsibility for addressing the unethical practices in the GVC came to encompass the entire value chain, first expanding via informal understandings within the public (i.e., NGO reporting and media) and, then, via institutionalization through government regulatory policy, individual firms adopted new strategies that reshaped the GVC structure. Therefore, the process for GVC structural change is observed to follow individual firm strategic changes, which were prompted by external pressures that increased the awareness and motivation for such strategic changes. Hence, as a novel application of Chandler's (1962) dictum, we can argue that GVC structure (and any

changes thereof) follows the global strategies of the value chain's member firms. When the strategies of firms shifted toward the objective of addressing the unethical practices in the GVC, changes in the governance structure of the GVC were required in order for firm ownership and control boundaries to more closely overlap with expanding responsibility boundaries.

Importantly, the case study also reveals how it was the institutionalization of the expanding responsibility boundaries that fostered the industry-wide awareness and motivation ultimately spurring the changes to individual firm strategies that altered the GVC governance structure. Following the awareness, motivation, and capabilities (A-M-C) framework used by Buckley and Liesch (2023), we can interpret how the introduction of public policy became the critical factor driving the greater internalization of responsibility boundaries. Indeed, the expansion of responsibility boundaries, which culminated in the institutionalization of these boundaries through the US government's implementation of a new public policy, resulted in a drastic increase in the awareness of the ethical issues encompassing the entire GVC. This industry-wide awareness and, by necessity, motivation to take specific actions (i.e., monitoring and due diligence) created the opportunity that motivated individual firms, such as KEMET, to internalize these responsibility boundaries as a source of advantage. Without the industry-wide imperative fostered by public policy, as evidenced by the period before the passage of the 2010 Dodd-Frank Act, the awareness and motivation to take strategic actions to alter the GVC structure was insufficient, yielding only rhetorical strategies such as the adoption of codes of conduct with limited reach due to the structural barriers to cascading compliance. In other words, the concerns over the unethical value chain practices *before* Dodd-Frank, while generating greater awareness and, to a degree, motivation to implement strategic changes to GVC governance, fell short of driving significant change.

Instead, justifying the significant costs entailed in integrating the value chain required the institutionalization of industry-wide responsibility to yield sufficient value for such a strategic action. KEMET's representation of its vertical integration strategy highlights the simultaneous motivation of both reducing transaction costs and creating transactional value (e.g., Dyer, 1997; Zajac & Olsen, 1993), the former motivated by the tantalum pricing volatility and supplier hold-up problems and the latter arising from the value available to KEMET's customers by virtue of the firm's supply chain being provably "conflict-free." Indeed, KEMET noted how "both our conflict-free efforts and the [Kisengo] Foundation's activities have resulted in a gratifying amount of positive press ... bolstering the KEMET brand" (KEMET, 2015, p. 3). The rhetoric of Per-Olaf Lööf, KEMET's CEO, expands this rationale: "... we can now tell our customers—because that is where this all originates; it is about people not willing to buy iPhones if they can't ensure that the tantalum used in those iPhones is conflict-free. That is where it starts" (US Congressional Hearing, 2015). This case reveals the possibility that vertical integration may be utilized, in part, as a socially responsible strategy—generating a "social brand" (Asmussen & Fosfuri, 2019) that can function as a firm-specific resource (i.e., Barney, 1991; Litz, 1996). The concept of a closed-pipe supply chain (e.g., Jorns & Chishugi, 2015; Taka, 2016), exemplified in this case by the actions of KEMET and, partially, by AVX, represent a novel framing of vertical integration as serving a purpose beyond the reduction of transaction costs by including the creation of transactional value through ethical supply chain management.

Notably, given the structural inertia of GVCs driven by an efficiency logic, sufficient motivation for individual firms to carry out strategic changes that would significantly alter the GVC structure will require impetus beyond a transaction costs rationale. Indeed, in the case of the digital electronics GVC, the institutionalization of responsibility boundaries forged an

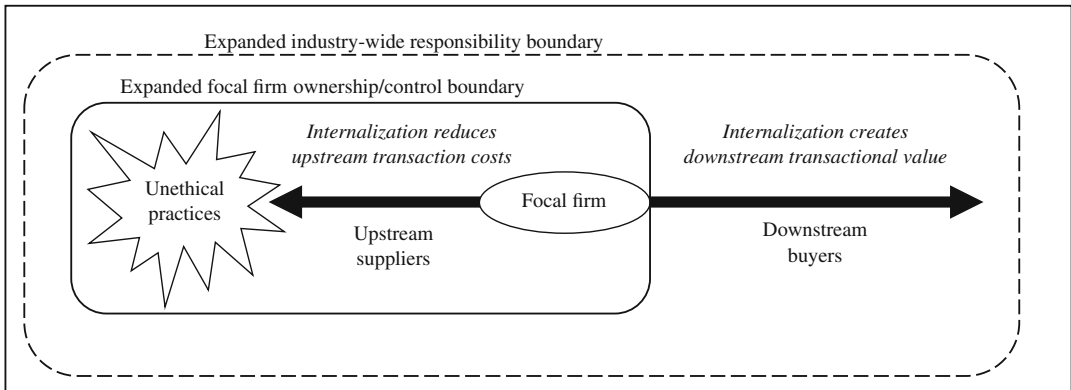


FIGURE 5 Internalization of responsibility boundaries to reduce transaction costs and create transactional value. *Source:* Various annual reports (KEMET, AVX, Vishay); USGS (2017a).

opportunity whereby a capacitor manufacturer, through backwards integration, could create demand-side transactional value by offering compliance-seeking buyers a clear, conflict-free path to low-cost DRC tantalum. Accordingly, the cases point to an instance where supply-side efficiency considerations were insufficient for motivating the internalization of firm ownership and control boundaries, requiring these *and* the ability to capture value arising from the expansion of responsibility boundaries across the entire GVC. By virtue of the focal firms' positioning in the GVC, betwixt upstream suppliers of materials and downstream buyers receiving the brunt of public scrutiny, a strategy of backwards integration could then simultaneously reduce upstream costs and create value for downstream buyers, as depicted in Figure 5.

8.3 | Practical implications for managers

In identifying the inherent obstacles for compliance embedded in GVC structures, this study points to several practical implications for managers who are intent upon taking seriously the responsibility that increasingly spans the range of GVC participants. First, managers of both lead firms and suppliers need to acknowledge the structural barriers limiting the efficacy of compliance models that attempt to preserve, rather than alter, the GVC structure. By carrying out an analysis of the GVC structure, it is possible for managers to identify the linkages where “cascading compliance” approaches break down, thereby requiring a *restructuring* that may work against a rationale purely based on efficiency considerations.

Second, managers should reconsider internalization of responsibility boundaries as a viable strategy to ameliorate unethical value chain practices, since such practices are often an unavoidable part of GVCs structured to be more efficient. Accordingly, it may only be through realigning firm boundaries of ownership and control with the boundaries of responsibility that can yield significantly positive changes to unethical GVC practices. Especially in a context in which responsibility has expanded to encompass all GVC participants, internalization can have the potential to reduce transaction costs and, crucially, create transactional value that can justify the costs of internalization.

Lastly, managers determined to make significant changes to the GVC structure will benefit from the institutionalization of responsibility boundaries through the introduction of public

policies—otherwise seen as costly measures for most firms in the GVC. Accordingly, managers can proactively advocate for government adoption of policies that formally extend responsibility, even if the direct impact of such policies appears to fall short of industry-wide changes. Indeed, prior findings in the same context point to the inefficacy of the Dodd-Frank Act to ameliorate the unethical supply chain practices (e.g., Ayogu & Lewis, 2011; Kim & Davis, 2016), owing to a lack of enforcement mechanism and the tendency for firms to merely adopt perfunctory codes of conduct (a la Vishay Intertechnology). What this case study reveals, however, is the mechanism by which the regulations did spur meaningful strategic changes, not by punishing non-compliant firms or pushing for industry-wide changes, but rather by driving individual firms to take action in the interest of capturing transactional value and seizing a competitive advantage made possible by the policy's expansion of responsibility and, with it, awareness and motivation for the industry as a whole. Such industry-wide responsibility tends toward fostering a collective action problem that creates a space for individual firms to create and capture value through a value-chain-integrating initiative. The managers of such enterprising firms choosing to initiate strategic changes to the GVC governance would be wise to support such policies through the development of a political global strategy, helping to forge an institutional context in which internalization of responsibility boundaries can create the transactional value needed to justify such strategic initiatives.

9 | CONCLUSION

In today's globalized economy, the de-integrated structures of many global value chains, while developing with particular consideration for greater efficiency under the auspices of powerful MNEs, have proven ill-equipped to deal with unethical practices which are often inextricably linked to the more efficient governance of GVCs. Yet, with a more expansive notion of responsibility encompassing the full span of a GVC, firms have needed to rethink GVC governance and develop global strategies, both individually and collectively, to incorporate an additional ethical consideration into their decision making and struggle against the structural inertia of GVCs. The institutionalization of responsibility appears to be one meaningful route to spur individual firm strategies that can alter the wider GVC structure, even if collective action fails to materialize.

Through a case-based process study designed to generate a contextualized explanation, I explored this intersection of business ethics, GVC governance, and global strategy to distill the varied strategic responses that firms pursue in response to similar efficiency, ethical, and institutional considerations. What we commonly assume to be the primary rationale for decisions around firm boundaries—that is, transaction costs economics—proves to be insufficient to fully explain the decisions of individual firms when issues of ethical responsibility, including its formalization through public policy, function as additional factors that may facilitate the creation of transactional value justifying internalization.

As any particular GVC features unique characteristics, further research on the questions explored here should include looking at different contexts, in which the boundaries of responsibility may be more narrowly demarcated than has been the case in the digital electronics industry. Additionally, the location of inherent flaws within a GVC—and, therefore, the actions required to address those flaws—will vary with the specific structure of the value chain, its complexity and number and relative power of its participants within each tier. Considering how



varying breadths of responsibility within a given GVC and the structural challenges unique to different value chains would alter the value of different strategies would aid in understanding how firms—and the public at large—should think of business responsibility for the ethical management of value chains. Such an understanding could assist business leaders in knowing the extent of their responsibility to act and the value different strategies may have, and it could inform public policy to more accurately and effectively develop responsibility boundaries in a manner that is most effective.

ACKNOWLEDGEMENTS

A previous version of this paper was presented at the 2022 AIB Annual Conference in Miami, and I thank all attendees who offered valuable feedback. My sincere gratitude to the editor Marcus Møller Larsen and the two anonymous reviewers for their guidance and encouragement throughout the review process.

ENDNOTE

¹ Though AVX is a subsidiary of Japan-based Kyocera, meaning the company's product portfolio includes Kyocera products, the subsidiary is headquartered in the United States. For this study, an important consequence of its US location, along with the other two firms (KEMET and Vishay), is their reliance on the same suppliers of tantalum powder, their engagement with the same customer base, and their being subject to institutional changes in the United States regarding the reporting of conflict minerals (i.e., the 2010 Dodd-Frank Act).

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How to cite this article: DeBerge, T. (2024). Responsibility boundaries and the governance of global value chains: The interplay of efficiency, ethical, and institutional pressures in global strategy. *Global Strategy Journal*, 14(1), 196–222. <https://doi.org/10.1002/gsj.1498>