Critical review

The operation of Global Production Networks (GPNs) 2.0 and methodological constraints

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ABSTRACT

The Global Production Network (GPN) 2.0 analytical framework addresses parts of the criticism of the operational limitations of the original GPN analytical framework (GPN 1.0) by proposing clearer operational guidance to unpack the specific relationships between the market environment and four actor-specific strategies adopted by lead firms and their suppliers. Due to the ambiguity of causal mechanisms and the real explanatory and dependent variables in the analytical framework, the specific setup of GPN 2.0 still demands careful research design and planning in order to identify the specific explanatory variables that are both valid and reasonably reliable for the rigorous and complex network analysis empirically required, i.e., it demands multi-scalar validity and reliability of the data, at least in the specific industry of interest for researchers.

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Contents

1. Introduction . . . ...................................................................................................... 265
2. A brief overview of GPN 2.0 .................................................................................... 266
3. The operation of GPNs and methodological constraints ................................................................. 267
3.1. Specificity of the causal mechanism .......................................................................... 267
3.2. What are the variables? ......................................................................................... 268
4. Conclusions. ...................................................................................................... 268
Acknowledgement . . . . . . . . . . . . . . . . .................................................................................... 268
References . ....................................................................................................... 268

1. Introduction

Since the publication of the paper on apparel commodity chains in the Journal of International Economics in 1999 by economic sociologist, social scientists have been adopting the Global Commodity Chains (GCCs) framework to examine the roles of industrial organizations in producer-driven and buyer-driven chains. The GCCs has since been developed into the Global Value Chains (GVCs) and this paradigm really took off after the publication of Gereffi et al.'s (2005) seminal paper on the typology of value chain governance.

Notwithstanding its usefulness in reconciling spatial inequality in development, economic geographers find the ‘chain’ metaphor adopted in the GCC/GVC framework unsatisfactorily restrictive in its application. In addition to its narrow focus on the governance of inter-firm transactions, they argue that the linear conceptualization of the production and distribution processes in GCC/GVC overlooks the complex network structures of economic activities in the real world (Henderson et al., 2002). To address this shortcoming, they developed the Global Production Network (GPN) (GPN 1.0), which is defined as “the globally organized nexus of interconnected functions and operations by firms and non-firm institutions through which goods and services are produced and distributed” (Coe et al., 2004: 471).1 GPN is a relational framework which

1 The initial analytical framework of GPN (GPN 1.0) is not conceptualized as a ‘toolkit’. The comments on the potential limitations on researchers that may encounter during the operation of GPN 2.0 is a timely review of the operation of GPN framework in general.
conceptualizes the networking nature of the global economy as a tangled web of production circuits and networks of interconnected economic processes that are grounded and embedded in specific locations.

GPN focuses on the roles of actors and their asymmetrical power relationships in the establishment of “strategic coupling” between lead firms and their suppliers to explain the activities and performance of various types of global network configurations, which result in value creation (through labour and rents), enhancement, and retention (via market or institutional advantages), and their subsequent economic impacts in various areas. This heuristic multi-actor and multi-scalar framework allows researchers to unpack complex networks with intricate links between various kinds of economic activities (Coe et al., 2008: 272).

GPN analysis focuses on the strategic coupling (economic linkages) between lead firms and their local suppliers (Henderson et al., 2002), and the empirical evidence is normally based on specific case studies, notably the BMW case outlined by Coe et al. (2004). By adopting a network ontology, this strand of the literature excels at unpacking the nuances between firm and non-firm actors in the establishment of the difficult to quantify complex production networks embedded within various socio-economic settings. The adoption of a network ontology, however, creates operational issues for researchers, specifically, its selective ontology and its potential methodological ‘blind spots’ of micro-scale analyses, from the selection of case studies to the incorporation of selected variables. Sunley (2008) delivers perhaps the most critical comments of GPN 1.0. By pointing out the lack of precision and problematic “selective ontology” (2008: 1–3), he criticizes the inclusive nature of GPN, which has unclear analytical boundaries and weak causal explanations. The frameworks are “defined in such an elastic manner that they can include virtually anything. One cannot escape the conclusion that such a loose and ubiquitous idea explains everything and nothing ... But if complex networks are continually changing, then it is impossible to stabilize the world to develop models of how it works” (Sunley, 2008: 8, 16).

Sunley (2008: 8) further points out the overemphasis on micro-scale processes and “ties and networks”, and the difficulty in validating the GPN framework empirically other than through qualitative case studies. Proponents of the GPN admit that to mitigate the potential “blind spots” of micro-scale analyses and enhance the GPN’s explanatory power requires a convergence of the quantitative analyses and case study approaches (Coe et al., 2010; Coe, 2012: 390, 395).

In addition to the lack of research on intrafirm relations (including their specific internalization or externalization functions), the importance of social and environmental upgrading has been recorded (Raj-Reichert, 2013, 2015; Barrientos et al., 2011; Bolwig et al., 2010). With minimal focus on the consumption segment of the networks, the inclusive nature of GPN 1.0’s analytical approach can suffer from selection bias whereby some of the most important explanatory variable(s) may not be emphasized or may even be omitted. For instance, institutional factors are generally not examined in great detail, while the linkages between the service and manufacturing sectors and their environmental externalities are largely omitted in the GPN literature, as admitted by Coe et al. (2008: 278; see also the conclusion).

GPN 2.0 has arguably improved on this shortcoming by specifying four groups of explanatory variables, but it is still not yet fully operational at the macro level through a quantitative analysis. A brief overview of GPN 2.0 is presented below, before a discussion of two methodological issues that hinder this framework from having a much wider use by geographers and other social scientists is outlined.

2. A brief overview of GPN 2.0

Coe and Yeung (2015) developed the GPN 2.0 to refocus the research from inter-firm relationships to intra-firm relationships. In contrast to GVCs, where the analytical focus is on a specific industrial sector or even commodities (e.g., coffee beans), GPN 2.0 focuses on lead firms (defined by the percentage size of its market share in a specific product market, not just a brand, e.g., Starbucks) and its corresponding networks, and the trajectories of value capture, enhancement and retention as well as its subsequent impact on spatial (unequal) development.

Coe and Yeung (2015) specified three aspects of competitive dynamics (namely cost-capability ratio, market imperatives, and financial discipline) plus the risk environment as the four major explanatory variables to expound four different actor-specific strategies for organizing GPNs in a competitive market scenario (Fig. 1). In GPN 2.0, the four explanatory variables are (i) the cost-capability ratio (defined as the ratio between costs and a firm’s capability), (ii) market imperatives (to maximize the value capture through access to and even domination of the market), (iii) financial discipline (in the form of pressures to create value for shareholders through synergy and developing new products/market), and (iv) the risk environment. In an uncertain market environment when financial pressure affects both firms and non-firm actors, firms react in four actor-specific strategies: (i) intra-firm coordination, (ii) inter-firm control, (iii) inter-firm partnership, and (iv) extra-firm bargaining.

To achieve a higher level of firm-specific efficiencies, lead firms together with their strategic partners and suppliers have to internalize and consolidate their value creation activities within their organizations through intra-firm coordination. Intra-firm coordination can be achieved through domestic expansion, or internalization through foreign direct investment by the lead firms, or mergers and acquisitions (M&As) initiated by lead firms with strategic partners, or specialization and in-house capacity building and/or the integration of independent suppliers, etc. (Coe and Yeung, 2015). Another strategy that lead firms could adopt is to externalize its risk by outsourcing its production to external suppliers and yet maintaining control over the production processes and the quality of the products/services through inter-firm control (Coe and Yeung, 2015: 135). This strategy is similar to the captive form of governance outlined by Gereffi et al. (2005).

To retain their competitiveness, lead firms can establish inter-firm partnerships in various forms, from collaboration, co-evolution, to joint development with strategic partners, specialized or key suppliers in the same GPN (Coe and Yeung, 2015: 142). These forms of partnership normally demand two necessary conditions: complementarities between the lead firm and its partners in terms of assets, technologies, knowledge, or market expertise as well as the existence of transparent industrial standards and codification schemes to improve the trust between the collaborating firms (Coe and Yeung, 2015). Japanese automobile manufacturers and their strategic tier-1 suppliers is one such typical example of an inter-firm partnership. To create, enhance, and capture value through the GPNs, lead firms also engage in extra-firm bargaining, which is “a contested two-way process of negotiation and accommodation” with extra-firm actors (state, NGOs, international organizations, consumers) (Coe and Yeung, 2015: 151).
In a word, the strategic coupling between lead firms and their embedded networks with strategic partners, (industry-specific or multi-industrial) specialized suppliers to generic suppliers are crucial for the trajectories of value capture, enhancement, and retention in various locations. Although various forms of strategic coupling remain the key apparatus in the formation of vertical (network) and horizontal (territorial) relations through which GPNs are articulated, the conceptualization of GPN 2.0 has, arguably, pushed the firm-centric concept of development further by delimiting the social, cultural, and environmental dimensions.

3. The operation of GPNs and methodological constraints

One of the major differences between GPN 1.0 and 2.0 is that Coe and Yeung (2015) outline four explanatory variables about the market environment and four actor-specific strategies as dependent variables for GPN 2.0 in their latest book. Notwithstanding the potential restrictions of the asocial and apolitical settings, this provides a (much) clearer analytical framework for researchers to fine-tune their project-specific research methods compared to the GPN 1.0 framework. This is an advance in the operation of the analytical framework, as it allows researchers to conduct ‘typology-type testing’ by collecting empirical data for each scenario of an actor-specific strategy. Nonetheless, there are two specific issues that could potentially hamper the application of GPN 2.0: the specificity of the causal mechanism, and the real variables in the analytical framework.

3.1. Specificity of the causal mechanism

The operation of this neatly presented mechanism of GPN 2.0 is hampered by the ambiguity of its specific causal mechanism. The four explanatory variables concerning the market environment have to work through a host of intra-firm factors before leading on to four actor-specific strategies (Fig. 1).\(^4\) However, it is not clear to researchers how these four explanatory variables interact with the firm’s features before leading on to the four actor-specific responses at the firm level. Proponents of GPN 2.0 counter-argue that Fig. 4.1 in the book is not conceptualized as an analytical framework with clearly defined explanatory and dependent variables, at least from the operational point of view.\(^5\) Methodologically, these intra-firm factors could nonetheless create unnecessary ambiguity for researchers.

The ambiguity of the four explanatory variables is an important issue for the application of GPN 2.0. First, to what extent is the cost-capability ratio a part of the financial discipline that economic actors (firms) encounter in the business world? Financial discipline is defined as pressure associated with financialization that may compel lead firms to make a strategic shift and thus result in different spatial and organizational configurations of GPN (Coe and Yeung, 2015). This financial pressure could come from shareholders demanding value creation through synergy and/or the exploring of new opportunities for products or markets. These considerations are obviously reflected both in the more specific cost-capability ratio and the financial discipline (for the lead firm) in general. This also points to another specific operational issue for researchers where multi-scalar variables are used simultaneously in the analytical framework. For instance, the cost-capacity ratio is a specific measurement and defined as the ratio between (operation) costs and the firm’s capability, while market imperative and risk environment can be measured both at the firm and/or product level, or even at the industry level. Proponents of GPN 2.0 admit that these four aspects of competitive dynamics are interrelated and reinforce each other. They counter-argue that the core focus of GPN analysis is always firm-specific: it focuses on inter- and intra-firm relationships and networks rather than sector-wide supply chain studies, as do the GCC/GVCs. They also point out that the first three aspects of market dynamics are introduced sequentially, with the risk environment as the underpinning rationale.\(^6\)

The setting of four aspects of competitive dynamics could well be a reflection of reality. Nonetheless, the explicit outline of these competitive dynamics as explanatory variables creates operational difficulties for researchers who may want to adopt this analytical framework for quantitative analyses – researchers have no choice but to ‘scale up’ the firm-specific approach to an industrial sector-wide examination. This is especially the case for researchers

\(^4\) These intra-firm factors are nationality and modes of ownership, managerial capacities, corporate culture, financial resources and technological assets (see Coe and Yeung, 2015, especially Fig. 4.1).

\(^5\) This point was also raised by Stefano Ponte in a GPN workshop held at the NUS on 6 May 2016.

\(^6\) Personal communication with Neil Coe (1 June 2016).
working in think-tanks who have to develop policy prescriptions for policy makers.

Second, the interactions between the explanatory variables could lead to invalid and unreliable empirical results in the quantitative analyses (Fig. 1). For instance, should the risk environment be an explanatory variable per se as it is clearly affected by the other three explanatory variables (i.e., multi-collinearity in regression analysis)? The risk environment is defined as the probabilistic outcomes which the (lead) firms may encounter (Coe and Yeung, 2015), and this is partially revealed in the cost-capacity ratio at the firm level (i.e., risk of launching a new product could be estimated at the firm level), and also partially affected by the sector-specific market imperative, e.g., lead firms with large market power have a lower risk of launching a new product; or in terms of buyer-driven versus producer-driven value chains, as in Gereffi (1994, 1999).7

3.2. What are the variables?

The above relatively neat specification of causal mechanism in GPNs forms part of the explanation for the strategic coupling and decoupling between lead firms and their suppliers, which in turn affects the trajectory of value capture, enhancement and retention, and eventually impacts on regional development (Coe and Yeung, 2015: 177) (Fig. 1). This, however, creates another methodological issue for researchers: what are the real explanatory and dependent variables for GPN 2.0? In Fig. 5.2 (Coe and Yeung, 2015) in their book, the explanatory variables could be the whole causal mechanism of the four explanatory variables (i.e., the cost-capability ratio, market imperatives, financial discipline, and risk environment) in the market environment and the four actor-specific strategies (i.e., intra-firm coordination, inter-firm control, inter-firm partnership, and extra-firm bargaining) outlined in Fig. 4.1, which in turn, affects the GPNs and their subsequent trajectory of value capture, enhancement and retention, and this eventually has an impact on regional development. If this is indeed the case, then the ultimate dependent variable should be regional development rather than the four modes of actor-specific strategies, and then there are two analytical frameworks: one for firm-level GPN, and one for the GPN-wider economy. This ‘framework inside another framework’ setting provides plenty of room for researchers to manoeuvre, but it could also be confusing for researchers or policy makers who may want to adopt it to examine an industrial survey and make subsequent policy prescriptions, i.e., the issue of ‘scaling up’ the firm-specific approach to industrial-sector-wide examination discussed in the previous section.

In other words, the GPN 2.0 analytical framework addresses parts of the criticism of the operational limitations of GPN 1.0 by proposing clearer operational guidance for unpacking the specific relationships between the market environment and four actor-specific strategies adopted by lead firms and their suppliers. Nonetheless, this specific setup demands a careful research design and planning in order to identify specific explanatory variables that are both valid and reasonably reliable for the rigorous and complex empirical analysis of networks, i.e., it demands multi-scalar validity and reliability of the data, at least in the specific industry of interest for researchers.

4. Conclusions

The motivation for developing GPN 2.0 was to improve the original GPN analytical framework (GPN 1.0). In particular, it attempts to address the criticisms of the selective ontology and its potential methodological ‘blind spots’ in micro-scale case study analyses.

The increasing popularity of similar frameworks, demonstrated by the wide adoption of GCC/GVC terminology (value chains) or even their analytical frameworks by international institutions and governments, could find economic geographers frustrated by their relatively limited impact on the formulation and development trajectory of public policy. Some typical examples of the adoption of the GVC framework can be find in a World Bank report on the post-2008 world economy: it claims that GVCs “have become the world economy’s backbone and central nervous system” (Cattaneo et al., 2010: 7). The UNCTAD Investment and Enterprise Division goes further by mapping the distribution of value added in global trade through a GVC dataset, and published a report entitled Global Value Chains and Development: Investment and Value Added Trade in the Global Economy (UNCTAD, 2013).

There is no doubt that Coe and Yeung’s (2015) efforts to extend the GPN analytical framework should be taken up, although the existing settings are still unable to provide researchers and policy makers with a simple ‘toolkit’, unlike the GVCs. This is perhaps due to the ideological constraints of (economic) geographers with their insistence on a heuristic and inclusive framework rather than the parsimonious and exclusive approach adopted by non-geographers. Should this indeed be the case, this is an inherent methodological constraint of GPNs vis-à-vis GVCs, and could still limit the empirical basis of GPN research and have relatively limited policy impacts on regional development. Therefore, the ‘holy grail’ of a convergence of the quantitative analysis and case study approaches to mitigate the potential ‘blind spots’ of micro-scale analyses in GPN, as recommended by Coe et al. (2010) and Coe (2012), has not materialized in the GPN 2.0.

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References


7 Coe and Yeung (2015: 110) differentiated this risk from uncertainty, as the latter is a condition that leads to unknown and random outcomes.


