NEIL M. COE & HENRY WAI-CHUNG YEUNG

GLOBAL PRODUCTION NETWORKS

theorizing economic development in an interconnected world



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Preface and Acknowledgements

In this book, we seek to consolidate and develop further a global production network (GPN) perspective for understanding the contemporary global economy and its developmental implications. It is the outcome of a fifteen-year collaborative research journey that both starts and ends in Singapore. In Chapter 1 we chart the intellectual and real-world trends underpinning this journey. Here, by contrast, we want to recap briefly the personal trajectories that have interwoven to create and drive our collective GPN research agenda.

Looking back, the initial catalyst for GPN research can be found in the visit of Peter Dicken (University of Manchester) to the Department of Geography at the National University of Singapore in the second half of 2007. There he was reunited with his former Ph.D. student (Henry Yeung) and was part of a research team-also including Phil Kelly, Lily Kong, and Kris Olds-who were grappling with how best to theorize the vortices of globalization that were already swirling around East and South-East Asia (and were manifest in the ongoing 'Asian' financial crisis at that time). The coalescence of different perspectives proved highly fertile, in particular with regards to tentatively developing a network ontology of the global economy. The tangible result was a collaborative paper in Global Networks (Dicken et al. 2001) in which elements of the then highly popular Actor Network Theory were selectively combined with more structural readings to produce a networked and relational understanding of economic globalization. The notion of 'global production networks', as we know it today, was itself born around this time through these intense discussions. Shortly after Peter returned to his base in Manchester, the second of us (Neil Coe) joined the National University of Singapore as a lecturer in 1998, adding an interest in service sector globalization to the ongoing discussions.

GPN research was given 'formal' status with the award of a large Economic and Social Research Council (ESRC) grant to Peter Dicken and Jeff Henderson at the University of Manchester in 2000. With funding to the tune of £330,000, the three-year project, entitled 'Making the Connections: Global Production Networks in Europe and East Asia', enabled both sustained theoretical work and detailed empirical research into three sectors—automobile components, electronics, and retailing—across multiple countries in Western Europe, Central and Eastern Europe, and East Asia. Some 160 interviews were conducted over the course of the project, along with extensive secondary data collection, producing a large real-world dataset with which to test the theoretical foundations of the emergent GPN conceptual framework. Those foundations were literally mapped out on overhead projector transparencies in one of the rooms in the University of Manchester's Mansfield Cooper Building in January 2001, and in 2002 were published in the *Review of International Political Economy* (Henderson et al. 2002). The paper introduced the distinctiveness of the GPN perspective, and contrasted it to prevailing theories at that time, and in particular the global commodity chain (GCC) that was starting to become a significant export from economic sociology.

As importantly as the research itself, the 'Making the Connections' project allowed the formation of a project team that included Peter, Jeff, Henry (as overseas collaborator), Martin Hess, Jennifer Johns, and Neil, who joined the University of Manchester as a geography lecturer in mid-2000, forging and deepening research connections that continue to the present day. In due course, the group attracted the moniker of the 'Manchester School' from one observer (Bathelt 2006). In addition to a series of empirical papers from the project, a second theoretical paper emerged from the ensuing theoretical discussions, resulting in the 2004 Transactions of the Institute of British Geographers contribution on strategic coupling and regional development (Coe et al. 2004). The article sought to bridge, analytically, work on global production and the vast literature on new regionalism and clusters, which was dominating debates in economic geography, urban and regional studies, and development studies at that time. Since the project finished, members of the research team have continued to work together, in different combinations and with new collaborators, to deepen and broaden the GPN research agenda, resulting in a number of state-of-the-art reviews and journal special issues (e.g. Hess and Yeung 2006a; Coe et al. 2008a; Yeung 2009a; Coe and Hess 2013; Neilson et al. 2014).

What has been missing up until this point, however, is a book-length treatment and further development of this GPN approach. A monograph was planned as part of the original ESRC project, but for various reasons did not come to fruition. Fortuitously, Neil's move (back) to the National University of Singapore in July 2012 created the conditions to make it possible for this book to be co-written in situ. If ever there was an example of how 'proximity matters', working together in the same department for the first time since 2000 has allowed us to develop the ideas in the book through sustained and intense interaction, including a period writing together during Henry's 2013 sabbatical leave at the School of Geosciences, University of Sydney, Australia. This book looks to consolidate earlier ideas distributed across different journal articles and, more importantly, to engage in a new and ambitious round of theoretical development (GPN 2.0) that seeks to extend significantly the explanatory power of the original heuristic framework (GPN 1.0). In sum, our central aim, after some fifteen years of collaborative GPN research, is to try and initiate a step change in conceptual development that can underpin new rounds of empirical exploration.

The deeply collaborative nature of GPN research means we are inevitably indebted to many friends and collaborators and have many people to thank. We must start with the core members of the 'Manchester School' *c*. 2000–3— namely, Peter Dicken, Jeff Henderson, Martin Hess, and Jennifer Johns. They created an open, supportive, and fertile research environment from within which a new research agenda could emerge. Peter and Martin have continued to be constant interlocutors and co-authors over the subsequent decade, and their insights and knowledge feed into many pages of this book. We thank them for their intellectual generosity; this book could not have been written without them. Our personal debts to Peter Dicken go far beyond the bounds of GPN research, of course, and we hope that he will accept the dedication of this book as a small repayment.

More broadly, we have also benefited hugely from ongoing engagements with a broad community of scholars, both within economic geography and beyond, pursuing global value chain and global production network research of various kinds. We thank (and apologies for any omissions): Yuko Aoyama, Jennifer Bair, Stephanie Barrientos, Harald Bathelt, Gavin Bridge, Peter Buckley, Tim Bunnell, Philip Cooke, Stuart Dawley, Lisa De Propris, Dieter Ernst, James Faulconbridge, Niels Fold, Gary Gereffi, Peter Gibbon, Jim Glassman, Gary Hamilton, Markus Hassler, Jinn-Yuh Hsu, Ray Hudson, Alex Hughes, John Humphrey, Raphael Kaplinsky, Phil Kelly, Roger Lee, Yong-Sook Lee, David Levv. George Lin, Weidong Liu, Peter Lund-Thomsen, Danny MacKinnon, Matthew Mahutga, Fritz Mayer, Will Milberg, Ram Mudambi, Jim Murphy, Khalid Nadvi, Jeffrey Neilson, Kris Olds, Mario Parrilli, Jamie Peck, Nicola Phillips, John Pickles, Stefano Ponte, Jessie Poon, Bill Pritchard, Roberta Rabellotti, Al Rainnie, Andrés Rodríguez-Pose, Hubert Schmitz, Adrian Smith, Tim Sturgeon, Lotte Thomsen, Ted Tschang, Jan Vang Lauridsen, Peter Wad, Kevin Ward, Dennis Wei, Marion Werner, Dariusz Wójcik, Steve Wood, Neil Wrigley, Charlotte Yang, Daniel Yang, and Yu Zhou.

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Closer to home, the Politics, Economies, And Space (aka 'PEAS') research group in the Department of Geography at the National University of Singapore continues to provide a supportive yet challenging testing ground for our research ideas. In particular, we thank Carl Grundy-Warr, Karen Lai, Harvey Neo, James Sidaway, Woon Chih Yuan, Godfrey Yeung, and Zhang Jun (now at the University of Toronto) for stimulating lunchtime debate over the past few years. We also thank our graduate students, past and present, who have helped to 'road test' some of the ideas presented in this book in the field: at Manchester, Costas Antonopoulos, Alexandra Dales, Ross Jones, David Jordhus-Lier, Katie May, Piotr Niewiadomski, Yue Wang, and Jennifer Watts, and, at NUS, Rachel Bok, Chen Rui, Li Na, Lim Kean Fan, Liu Yi, and Aidan Wong. Our home institution, NUS, has generously funded several projects related to our GPN pursuits (R-109-000-148-133; R-109-000-050-112; R-109-000-116-112; R-109-000-173-646; R-109-000-158-646).

As of October 2014, an exciting new phase in our research journey began with the launch of the Global Production Networks Centre at the National University of Singapore (GPN@NUS for short) that we co-direct. This three year NUS-funded initiative brings together a multidisciplinary team of ten researchers (scheduled to reach between fifteen and twenty by mid-2015) with the aim of conducting a comprehensive programme of theoretical development and empirical research on global production networks across Asia. The core team consists of Davin Chor, Kurtulus Gemici, Albert Hu, Soo Yeon Kim, Karen Lai, Jang-Sup Shin, Aidan Wong, and Godfrey Yeung. We are excited about working with them over the next three years and hopefully beyond.

We end by returning to where it all begins—our families. Our children— Laura and Adam, and Kay and Lucas—have literally grown up with GPN research. Quite rightly, however, they have not let our weird ideas bother them, and have provided limitless joy, inspiration, motivation, and distraction along the way. And to our wives, Emma and Weiyu, we can only offer another heartfelt vote of thanks for constantly reminding us, even when we might think otherwise, that three-letter acronyms for global economic transformations reflect just a tiny fraction of what real life has got to offer.

> Neil Coe and Henry Yeung Singapore September 2014

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Abbreviations

3PL	third party logistics
4PL	fourth party logistics
ANT	actor-network theory
ASEAN	Association of South-East Asian Nations
BOP	bottom of the pyramid
CME	coordinated market economy
CMT	cut, make, trim
CSR	corporate social responsibility
EMS	electronics manufacturing services
EVA	Economic Value Added
FAO	Food and Agriculture Organization of the United Nations
FDI	foreign direct investment
GCC*	global commodity chain
GIN	global innovation network
GMO	genetically modified organism
GPN*	global production network
GVC*	global value chain
HACCP	hazard analysis and critical control point
ICT	information and communications technologies
IT	information technology
IMF	International Monetary Fund
ISO	International Organization for Standardization
LME	liberal market economy
NAFTA	North American Free Trade Agreement
NIDL	New International Division of Labour
OBM	original brand manufacturing
ODM	original design manufacturing
OEM	original equipment manufacturing
QIZ	Qualifying Industrial Zone
R&D	research and development
SoC	system-on-a-chip
TNC	transnational corporation

xviii	Abbreviations
UNCTAD	United Nations Conference on Trade and Development
VoC	varieties of capitalism
WTO	World Trade Organization

NOTE

* Readers are referred to note 2 in Chapter 1 for further explanation of how these specific acronyms are used in the book.

1

Global Production Networks 2.0

In this book we argue that organizationally fragmented and spatially dispersed production networks constitute a new form of economic structure that increasingly drives the complex global economy and its uneven developmental outcomes. A wide range of terminology and concepts has appeared since the early 1990s to try and capture this emerging phenomenon. From a trade perspective, global exports of intermediate goods now exceed exports of final and capital goods, as more and more parts and components are traded for use in subsequent international production and exports. As Gereffi (2014: 11) notes, 'governments and international organizations are taking notice of this emerging pattern of global trade, which is called a shift from "trade in goods" to "trade in value added", "trade in tasks" and "trade in capabilities"'. From a purchasing firm or 'buyer' perspective, others prefer to use the language of outsourcing to capture the procurement of intermediate inputs from abroad, through either externalized relationships (that is, offshore outsourcing) or intra-firm trade (that is, offshore insourcing from affiliates). From a commodity perspective, advocates of a global commodity chain (GCC) approach focus on the governance processes involved in producing specific services and goods throughout the global economy. In contrast to these perspectives, our approach foregrounds the key economic actors involved in these processes and, as such, resonates with growing academic and policy interest in global value chains (GVCs). A 2010 World Bank report on the post-2008 world economy, for instance, claims that, 'given that production processes in many industries have been fragmented and moved around on a global scale, GVCs have become the world economy's backbone and central nervous system' (Cattaneo et al. 2010a: 7). To analysts in many international organizations it seems, global value chains are now recognized as the new long-term structural feature of today's global economy.¹

In an endeavour to reframe these debates and develop a more dynamic theory of global production, our preference in this book is to refer to the emergence and development of *global production networks* within the global economy. We define a global production network as an organizational arrangement, comprising interconnected economic and non-economic actors,

coordinated by a global lead firm, and producing goods or services across multiple geographical locations for worldwide markets. As we shall explain in this chapter, this choice of terminology is not incidental, but rather reflects our commitment to an analytical approach that does justice to the multi-actor and geographically complex contemporary global economy. Our focus is clearly on the *actors* that constitute global production networks, with a lead firm being a central and necessary prerequisite, and on the multiple locations that are bound together by the economic relations between those actors. The idea of a global production network goes beyond simple notions of trading tasks and outsourcing to highlight the actor-specific firm coordination and cooperation strategies through which such networks are constructed, managed, and sustained. It also considers the strategic responses of the other corporate and noncorporate actors within the global production network. This central focus on actors also distinguishes global production network (GPN) thinking from those that focus on a particular commodity (for example, GCC research) or the aggregation of different value chains into industries (for example, GVC research).² Our central aim in this book is to show how the GPN approach we espouse can provide a powerful framework for explaining patterns of uneven development both between and within countries—in the contemporary global economy.

In starting our account, this introductory chapter has three objectives. It will introduce the intellectual context in which the GPN framework first appeared in the early 2000s and will distil its basic attributes in relation to cognate approaches. We will also map out the structure and arguments of the book, detailing how we seek to develop an enhanced GPN theory—for which we use 'GPN 2.0' as convenient shorthand—that builds upon, and significantly extends, existing work under this banner. First, however, it is important to establish the key structural forces behind the emergence of global production networks as an organizational phenomenon within the global economy since the early 1990s.

A NEW GLOBAL ECONOMY? TOWARDS AN INTERCONNECTED WORLD OF PRODUCTION

The goods we buy are the end result of an elaborately choreographed transnational odyssey. These objects are part of an economy whose tendrils reach over further outward, linking, integrating, and transforming both far-flung and nearby places. (Kenney 2004: 1-2)

Kenney's quotation evocatively captures the essence of today's global economy. The ever-deepening spatial and organizational fragmentation of production has produced a global economy that is profoundly different from the one of 1990. Organizational shifts have been accompanied by profound geographic shifts relating to the rise of emerging market transnational corporations (TNCs), and shifts in global patterns of demand towards the Global South, both in terms of burgeoning levels of so-called South–South trade and as a focus for firms from the Global North. These trends have arguably accelerated since the global recession that commenced in 2008, which has also prompted a 'shake out' and consolidation of global production networks in many industries. It is not our aim in this book to map exhaustively these shifting patterns within the global economy.³ We do, however, need to explain the fundamental conditions and capitalist imperatives that have underpinned the emergence of global production networks as perhaps *the* predominant organizational feature of the world economic system. What follows is necessarily a very brief résumé of what in reality are highly complex and variegated dynamics of industrial and organizational change on a global scale.

During much of the first half of the twentieth century, industrial capitalism was largely nationally bounded in an era of mass production commonly known as Fordism.⁴ While there were, of course, international production systems by this time, they tended to be dominated by relatively self-contained multi-domestic structures through which TNCs replicated their home operations abroad. By the late 1970s, the advanced economies of North America and Western Europe had begun to experience a radical transformation in their Fordist production systems towards a more flexible and spatially dispersed mode of economic organization. In their highly influential work The Second Industrial Divide, Piore and Sabel (1984) describe this episodic shift in the organization of global capitalism as a move towards 'flexible specialization', manifested in more flexible intra-firm relations, rapid vertical disintegration of production processes, and the emergence of extensive hybrid and non-hierarchical forms of organizing production such as subcontracting and spin-offs. Instead of the extensive intra-firm technical division of labour prevalent in the Fordist production system, a deepened social division of labour was embedded in these new flexible production systems. In Manufacturing Possibilities, Herrigel (2010: 186) succinctly characterizes flexible specialization as

intense and ongoing collaboration between design and manufacture in the context of increasing fragmentation of the division of labor within and across firms. Production units have become smaller, and frequently transformed into separate legal entities. Their relations are continuously recomposed through collaboration and negotiation, rather than market signals or hierarchical directives. Relations among collaborating producers, furthermore, are often governed by an array of extra-firm practices and institutions designed to balance cooperation and competition and facilitate continuous recomposition of roles and capacities. These relations characterize practices within developed and developing contexts as well as those that bridge both milieus.

One of the main impetuses behind this structural shift in Atlantic capitalism during the 1970s was the crisis of Fordism, which related to the challenges of increasing competition at the global scale. The sources of this competitive challenge could be found in the rapid internationalization of domestic production systems and the entry of new competitors from East Asia-first Japan in the 1960s and the 1970s, followed by the four Tiger economies of South Korea, Taiwan, Singapore, and Hong Kong in the 1970s and the 1980s. The adoption of flexible production systems became a capitalist strategy to create and sustain competitive advantage. To Piore and Sabel (1984: 17), flexible specialization was 'a strategy of permanent innovation: accommodation to ceaseless change, rather than an effort to control it. This strategy is based on flexible-multi-use-equipment; skilled workers; and the creation, through politics, of an industrial community that restricts the forms of competition to those favoring innovation'.⁵ From the debris of post-Fordist deindustrialization and capitalism's incessant drive for innovation emerged major lead firms, defined by their capacity to exercise product and/or market control, and their expanding global production networks in different 'propulsive' industries such as automobiles, electronics, semiconductors, and machinery.⁶

As their markets and competitors have progressively become more globalized, lead firms in different industries have become driven primarily by three capitalist dynamics: (1) cost, (2) flexibility, and (3) speed.⁷ These dynamics can have major and, yet, differentiated consequences for the configuration of their global production networks and economic development in different regional and national economies. In turn, these capitalist drivers need to be 'fixed' in order for specific lead firms to thrive in the post-Fordist global economy; the ensuing reorganization of value activities has led to the emergence of global production networks. Couched in geographical, organizational, and technological terms, these fixes represent distinct but interlinked responses to the three capitalist drivers.

First, the perennial drive towards lowering costs is now an established idiom in almost any economic analysis of industrial competition. As global competition intensified and product life cycles shortened by the 1990s, lead firms became more concerned with *cost drivers*, particularly production costs. With greater maturity in manufacturing technologies, standardization and modularization of products and components, and lower profit margins, manufacturing production could now be outsourced to specialized manufacturers that enjoyed both scale and scope economies and therefore significant cost advantages. Since the 2000s, these specialized manufacturers have grown to a massive scale and become TNCs in their own right. This outsourcing possibility has also enabled lead firms to concentrate on their core competencies and strategic new business areas, and to mitigate the investment risks associated with severe fluctuations in market demand.

In the service sector, similar cost pressures exist in a wide range of producer service industries such as finance, accounting, and software. Supply of non-core services to these industries, ranging from human resources and information and communication technology services to office management and maintenance work, can now be more economically outsourced to specialized service providers in different localities. Overall, this competitive cost pressure results in a spatial fix through which lead firms in manufacturing and service industries seek lower-cost suppliers in international markets. National economies suffering from high costs have witnessed the unfolding of the process of deindustrialization, whereas lower-cost economies have gained investment through the emergence of a new international division of labour.⁸ This process of spatial fix is best observed in the international relocation of significant proportions of European and American manufacturing activity to East Asian economies since the 1970s.⁹ It also constituted a critical precondition for the early success of export-oriented industrialization in these economies during the 1970s and 1980s.

While this spatial fix can alleviate, at least temporarily, the cost problems of global lead firms, it is clearly not a long-term solution to their competitive plight. Two other firm-specific dynamic capabilities—flexibility and speed—have arguably played a much more important role than has been previously understood in the economic development literature.¹⁰ In order to compete more effectively in the post-Fordist global economy, lead firms began to opt for what might be broadly termed an *organizational fix*. Starting in the 1990s, lead firms realized that competitive advantage could be obtained through a more flexible and efficient form of organizing production on a global scale. Reorganization of production networks does not necessarily entail geographical relocation of production, particularly the lead firm's own production facilities. Instead, an organizational fix results primarily from a choice of different business strategies; it is about strategizing around the organizational principles that afford the most competitive advantage.

The strategy of outsourcing to independent suppliers, for example, represents a popular organizational fix through which lead firms are able to increase their production flexibility without incurring the substantial financial and other liabilities associated with continuing existing, or establishing new, manufacturing or service facilities. Lead firms can sell their existing production facilities *in situ* to strategic partners from the same home economy or based elsewhere. The rise of contract manufacturing arrangements between lead firms and their strategic partners can be interpreted as an important organizational fix for these lead firms in several modularized industries such as electronics and machinery.¹¹ Modularization of key components also substantially lowers the cost of switching parts or production modifications. By making parts interchangeable, modularization promotes shared innovation and technological development because of the potential scale economies to be reaped by firms specializing in producing specific modules rather than the entire product. It encourages lead firms to collaborate with their strategic partners to share expertise and to develop jointly new products and services.

In advanced economies, lead firms have made major attempts to engage in what Herrigel (2010: 22) calls 'industrial recomposition' through which 'reflective and creative industrial actors perpetually recompose the social relations of manufacturing'. His study shows that lead firms in steel, automobiles, and machinery industries in German, Japan, and the United States have recomposed national and sub-national institutions and governance arrangements to respond more effectively to common competitive pressures in these global industries. Some of these recomposition arrangements do not necessarily lead to spatial relocation of production (that is, a spatial fix), but rather reintegration of different supplier-customer relations into new organizational fixes such as lean production and contingent collaboration. Through these different organizational arrangements in the post-Fordist era, production networks have become more internationally oriented and integrated, leading to the emergence of sophisticated global production networks orchestrated by global lead firms. But not all organizational fixes have led to the emergence of global production networks. In situ industrial recomposition tends to consolidate production networks within specific industrial districts and regional complexes-well-known examples include Baden-Württemberg (Germany), Silicon Valley (California, USA), and Toyota City (Japan)-creating divergent patterns of value activity configuration. Organizational fixes therefore produce highly differentiated geographies of manufacturing production and service provision that in turn create divergent growth possibilities and developmental trajectories for different regional and national economies-one of the core analytical issues in this book.

The search for low-cost production locations and the creation of organizational economies, however, do not capture fully the nature of capitalist dynamics in an era of globalization. These dynamics have compelled firms to search for new competitive advantages enabled by improvements in transport and communication technologies, a phenomenon described by Harvey (1989) as 'time-space compression'. This temporal acceleration in competitive pressure has substantially increased the demand for quicker time-to-market as a critical tool for capturing value from the early stages of the product life cycle and/or winning market share. Time-to-market thus becomes one of the most important competitive pressures that forces global lead firms to reconsider their role in different global production networks. As product life cycles become increasingly short owing to both disruptive technological change (for example, the digital revolution and nanotechnology) and market preferences for product diversity and turnover, time-to-market has emerged as a critical success factor in global competition.¹² To accelerate its time-to-market, a lead firm may engage in a spatial fix by locating its production of goods or services in close proximity to its emergent or realized markets. It may also develop an organizational fix through deeper integration of its various value creation platforms within emergent global production network to accelerate innovation, production, and delivery to market. Production costs now intersect with time-to-market in determining the success, or not, of lead firms.

Apart from organizational flexibility, the adoption of new technological solutions can significantly improve a lead firm's time-to-market capability. This approach can be termed a *technological fix* that points to the critical role of technological innovation in the competitive dynamics of lead firms and other actors in global production networks.¹³ Mathews and Cho (2000: 10–11) differentiate three competitive positions based on technological innovation: product innovation, process innovation, and technology diffusion management. They argue that East Asian firms from South Korea, Taiwan, and Singapore, for example, do not necessarily focus on the first two positionsproduct and process innovation. These competitive positions tend to be taken up by American, European, and Japanese firms that specialize respectively in new product innovation through developing first-mover advantages, and in quality improvements and time enhancements via process technologies. Instead, these East Asian firms take up the third competitive position by leveraging on technological resources embedded in, and diffused through, inter-firm linkages in global production networks and other technological alliances and consortia. In doing so, they are able to compete effectively in high-tech industries such as semiconductors. In the electronics industry, for example, information technology solutions and global electronic platforms have contributed to the successful organization of production networks on a global scale by lead firms. Such a technological fix can be seen in the widespread deployment of digital solutions, such as electronic data interchange with customers and suppliers in both manufacturing and service sectors, internet-based integration of manufacturing processes and enterprise resource planning systems, and the global tracking systems offered by third-party logistics providers.¹⁴

This technological fix often feeds back into the dynamic organization of global production networks by facilitating the vertical disintegration and the subsequent *vertical specialization* of production in different manufacturing and service industries. Since the 1980s, global lead firms have found it increasingly hard to excel in every aspect of the value chain and instead have preferred to specialize flexibly in segments in which they possess the greatest core competencies. These segments usually encompass research and development (R&D), product design, manufacturing of core products, marketing, distribution, and, in some cases, post-sale services. By the early 1990s, global lead firms in different global production networks and industries had moved towards a business model of increasing specialization in value activities. This trend has been much further accelerated since the late 1990s,

particularly in the electronics, automobile, clothing, retailing, and logistics sectors. This specialization entails global lead firms playing a more strategically focused role in the upstream (R&D) and downstream (marketing, distribution, and post-sale services) segments of the value system, leaving much of the manufacturing portion to their international strategic partners and dedicated supply-chain managers.

This process of vertical specialization refers to the multiple specializations of a lead firm in different stages of the same value system. It is vertical because both upstream and downstream specializations can be possible within the same lead firm. It is also different from vertical disintegration, a process not necessarily associated with multiple specializations. While they continue to shed their production activity to specialist manufacturers and strategic partners, global lead firms also accelerate their network-based innovation through engaging with a wide range of knowledge diffusion mechanisms that are increasingly linked to information management systems and the emergence of transnational knowledge communities.¹⁵ The implication of vertical specialization for economic development is highly contingent on the strategies of lead firms and their changing organization of global production networks. As argued by Lüthje (2002: 228; emphasis omitted), 'there may emerge different trajectories of technological learning depending on the position of particular districts or regions within the international division of labor in the production networks of the respective industries'.

In short, global production networks have emerged as the pre-eminent form of integrated 'fix' to the dynamic challenges of cost, speed, and flexibility that underpin competitive success in the contemporary global economy. As an increasingly dominant organizational form, they simultaneously combine elements of the spatial, organizational, and technological fixes described above. If the initial international division of labour established by European colonial powers was primarily based on trade, and the new international division of labour that emerged in the 1960s and 1970s was mostly driven by the establishment of wholly owned subsidiaries by TNCs, the contemporary global division of labour reflects the formation of global production networks across myriad sectors and industries since the 1990s. Control and coordination within this system are enacted not primarily through direct ownership, but by lead firms using complex combinations of subcontracting, alliances, partnerships, and other forms of non-equity relationships.

THE EMERGENCE OF GPN 1.0

These rapid and profound developments within the global economy have posed significant challenges to theorization since the early 1990s. The most productive lines of enquiry within the critical social sciences during that time have shifted the analytical focus from trade between national economies to the tightly coordinated global chains or networks of firms that, as we have just seen, are the key organizational form within the contemporary global economy. In this section we chart and contextualize the emergence of one such approach—the global production networks (GPN) framework that underpins this book. We use the shorthand GPN 1.0 to denote the initial formulation, which emerged in the early-to-mid 2000s and with which we have worked since then. As we shall see in the last part of this introductory chapter, the central aim of this book is to push towards a new version—which we dub GPN 2.0—that seeks to deepen significantly its analytical and explanatory power and move towards a more dynamic theory of global production networks. First, however, it is important to understand the intellectual context from which the GPN 1.0 framework initially emerged and the contributions that it was seeking to make.

Antecedents

While global chain/network theories have roots that can be traced to the 1980s, undoubtedly a key event was the Sixteenth Annual Conference on the Political Economy of the World System, held at Duke University, USA, in April 1992.¹⁶ The edited volume that emerged from the conference and was published in 1994-Gereffi and Korzeniewiecz's Commodity Chains and Global Capitalism-launched a genre of sustained research into global commodity chains (GCCs) that continues today.¹⁷ Drawing their initial inspiration from Immanuel Wallerstein's world-system framework (1974)-in which different national economies are sorted in an interconnected order of core, semi-periphery, and periphery-Gereffi and Korzeniewicz contributed in particular the identification of global commodity chains as a new conceptual category for 'understanding the changing spatial organization of production and consumption in the contemporary world-economy' (Gereffi et al. 1994: 2). In an attempt to move beyond the then nation-state centric modes of analyzing the global economy, global commodity chains were defined as 'sets of interorganizational networks clustered around one commodity or product, linking households, enterprises, and states to one another within the worldeconomy. These networks are situationally specific, socially constructed, and locally integrated, underscoring the social embeddedness of economic organization'. The idea was to forge a meso mode of analysis that could probe 'above and below the level of the nation-state' and reveal the 'macromicro links between processes that are generally assumed to be discretely contained within global, national, and local units of analysis' (Gereffi et al. 1994: 2).

Each global commodity chain is deemed to have four interrelated dimensions. First, the input-output structure identifies the various products and services that come together in a value-adding sequence to deliver a given economic activity. Second, the territoriality refers to the spatial configuration of the various actors involved, be that in terms of the spatial concentration or the dispersal of the constituent actors and economic activities. Third, each global commodity chain embodies a governance regime reflecting the relations of power and authority within the chain and how they shape the flows of materials, capital, technology, and knowledge therein. Fourth, global commodity chains are also reflective of the wider institutional frameworks that surround them, and particularly state policies and regulations in domains such as trade, investment, and technology.¹⁸ In particular, the third dimensiongovernance-has provoked a rich furrow of GCC research, building on Gereffi's seminal distinction (1994) between 'producer-driven' and 'buyerdriven' commodity chains. The foundational importance of this distinction is such that we will briefly reiterate it here.

Producer-driven chains are argued to be commonly found in industries where large industrial TNCs play the central role in controlling global production structures-for instance, in capital- and technology-intensive industries such as aircraft, automobile, computer, semiconductor, pharmaceutical, and machinery manufacturing. Power in these chains is exercised through the headquarters operations of leading TNCs, and manifests itself in the ability to exert control over backward linkages to raw material and component suppliers, and forward linkages with distributors and retailers. High levels of profits are secured through the scale and volume of production in combination with the ability to drive technological developments within the production system. Buyer-driven chains, on the other hand, tend to be found in industries where large retailers and brand-name merchandisers are the key actors in establishing and controlling the global production systems of their commodities, usually located in export-oriented countries. This form of global commodity chain is common in labour-intensive consumer-goods sectors, such as clothing, footwear, and toys. Production is usually undertaken using tiered levels of subcontractors that supply finished goods subject to the pricing and product specifications of the powerful buyers. These buyers extract substantial profits from bringing together their design, sales, marketing, and financial expertise with strong brand names and access to large consumer markets in developed countries.

While an impressive body of work has been produced since the initial formulation of the GCC concept, several clear limitations became readily apparent from the late 1990s onwards. First, as already noted, despite the analytical identification of four dimensions, in reality governance structures have dominated research under the GCC banner.¹⁹ A related concern is that the distinction between producer-driven and buyer-driven chains, while useful