

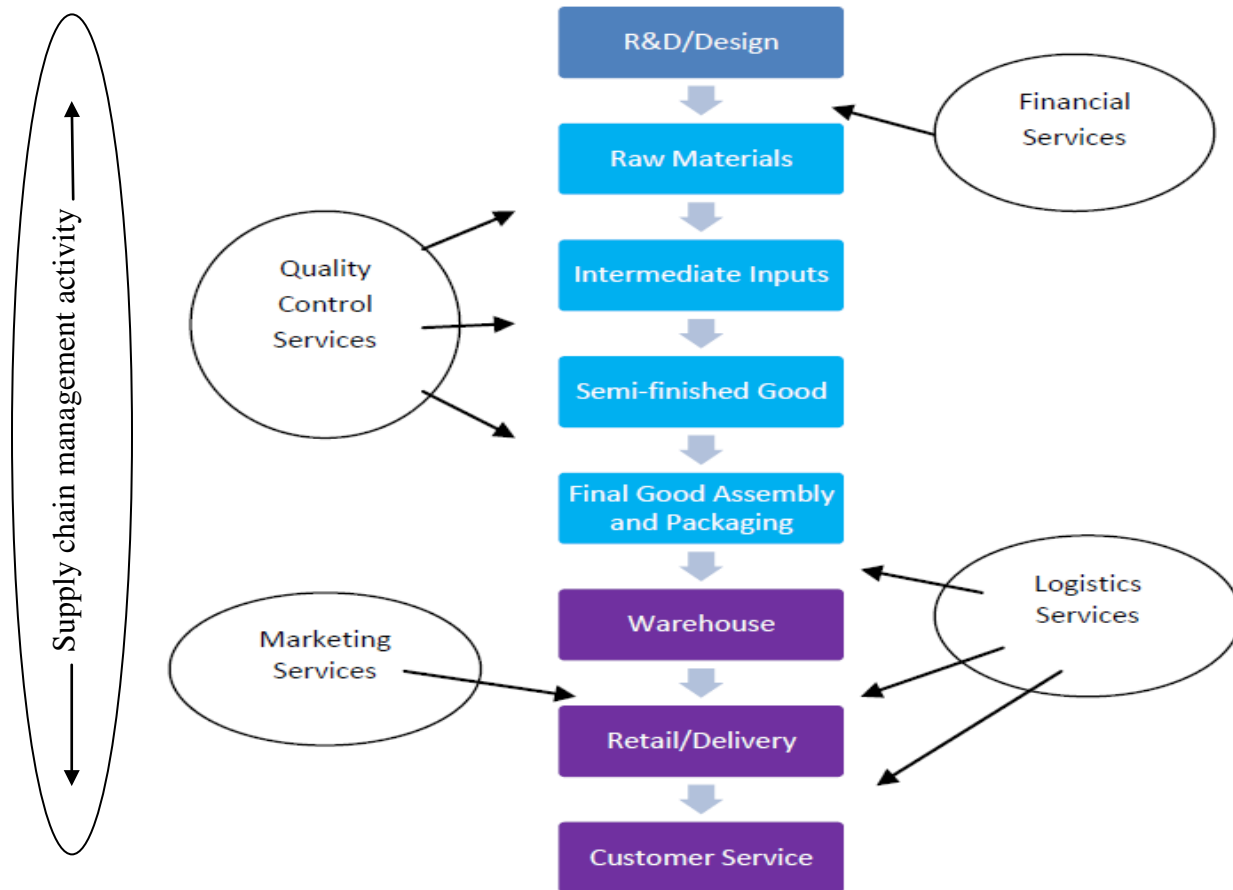
# Typology of Global Production Arrangements

## Introduction

This chapter focuses on developing a typology of global production arrangements defined as an interlinked process performed in more than one country, which leads to an output, where one entity, usually the principal, exerts a certain level of control over the process. These interlinked production activities are commonly referred to as global supply chains or global value chains.

The activities involved in global value chains can be grouped into broad stages of production from upstream R&D and design, through manufacturing, to downstream logistics, marketing, and sales. These broad stages of production are useful in properly assigning the kind of economic activity (in terms of International Standard Industrial Classification (ISIC)) of principals, suppliers, contract producers and other participating units in the global production chain. Each stage of the production process includes a large number of tasks. In a global value chain many of the tasks are 'offshored' either through an enterprise's own affiliates located in foreign countries or through independent contractors.

**FIGURE 1** Illustration of a simple supply chain



Source: U.S. International Trade Commission compilation

For example, a firm, the principal, might provide the R&D and design of a product (the intellectual property (IP)), and produce the initial intermediate inputs. Then these intermediate inputs would be exported to a second country, where a firm used them to produce a semi-finished product. That firm would then export the semi-finished good to a third country where the final good is assembled and packaged. The third country would then export the good back to the principal or the principal could have it shipped directly to the final buyer in another country. The principal oversees the marketing, retailing and delivery of the product domestically and abroad even if the principal does not take physical possession of the final good.

Determining the economic owner of the material inputs and outputs at each stage of the production process is a key criterion for identifying the kind of economic activity of the principal and the supplier. The new revision 4 of the ISIC classification states that global manufacturers are to be classified based solely on ownership of input materials. "A principal who completely outsources the transformation process should be classified into manufacturing if and only if it owns the input materials to the production process – and therefore owns the final output." (ISIC rev. 4) For ISIC, a unit that outsources transformation but owns inputs is a manufacturer and a unit that outsources transformation and does not own inputs is treated as being engaged in trade. This criterion for classification of a unit based solely on ownership of material inputs may not be appropriate in the case of 'factoryless' producers. A 'factoryless' producer may have substantial input in the form of R&D and other intellectual property embedded in the good, and may organize the production process.

The ISIC classification based on ownership of material inputs is consistent with how these international transactions are recorded, that is, international transactions take place when a change in economic ownership takes place between a resident in one economy with a nonresident. However, this general principle is not simple to apply in practice.

*"The SNA now recommends that products should only be recorded as being delivered to another unit if there is a change of ownership or, in the case where both producing units belong to the same enterprise, the producing unit taking delivery also assumes responsibility for subsequent risks and rewards of production such as deciding how much to process, what price to charge and when to sell." (2008 SNA 28.15)*

### **Issues with Implementation**

Implementing the international accounting recommendations is complex because global production arrangements vary and there is no commonly understood typology on how to treat such arrangements. Global production may vary in the complexity of the tasks required, output specifications, ability or willingness of the principal and supplier to take responsibility of the production process. In a producer-driven chain, the principals are usually involved in R&D and design and exert some amount of control over the production process through the ability to specify inputs and monitor quality control.

These chains are most often found in high-tech goods such as semiconductors, electronics, and pharmaceuticals that integrate specialized design, complex production processes, and extensive R&D. In a buyer-driven chain, the principals are usually involved in retail and are associated with standardized, lower tech goods such as apparel.

It may be difficult to determine the economic owner of material inputs, outputs, and intellectual property of the various units in the global production chain because of strategic alliances and tight mutual relationships especially in the case of multinational enterprises. A paper by Gereffi et al (2005) provide three dimensions for understanding how global value chain arrangements are organized by assigning different values (low or high) to the three key variables:

1. Complexity of information and knowledge required for the transactions (product and process specifications)
2. The degree to which this complexity can be mitigated through codification
3. The extent to which suppliers have the necessary capabilities to meet the buyers' requirements.

These governance types range from market oriented arrangements where the principal exerts little control over the production process to the other end of the spectrum where the principal exerts full control over the production process. These different types of arrangements can be helpful in identifying how much explicit coordination takes place and can be an indication of how much control (and the associated risk) the principal has over the production process.

### **Work Plan for Task Force on Global Production**

The first step of the task force is to specify what dimensions are needed in the typology of global production arrangements. Statistics Netherlands prepared an in-depth review of global manufacturing arrangements and specified the following dimensions (as seen in figure 2):

1. The process is performed by a principal in one country and by a supplier in another country.
2. The relationship between economic activity of the principal and the supplier relative to the economic ownership of the material inputs, intellectual property, and outputs.

**Figure 2**  
**2008 SNA/BPM6 based typology of value chains**

		Economic ownership of			Economic engagement in terms of production
		a) material inputs	b) intellectual property	c) outputs	
1.	Principal	+	+	+	Manufacturer
	Supplier				Industrial service provider
2.	Principal		+	+	Merchant
	Supplier	+			Manufacturer
3.	Principal		+		Principal acts as parent and is not engaged in production of goods. Parent is responsible for supply of knowledge inputs.
	Supplier	+		+	Supplier is as an independently operating branch engaged in manufacturing.
4.	Principal				Principal is not connected to the value chain and may act as (foreign) direct investor.
	Supplier	+	+	+	Supplier is an independently operating company or branch.

Source: In-depth review on global manufacturing prepared by Statistics Netherlands

The Statistics Netherlands' in-depth review focused on global manufacturing but the task force is to focus on global production; therefore, additional non-manufacturing arrangements should be added to the typology. Some examples of such arrangements are agricultural production and large scale turnkey projects delivered by project vendors (power plants, telecommunication networks, gas pipeline networks). The following additional dimensions could be added to broaden the description of the production process:

3. The type of output being produced (goods, services excluding intellectual property products (IPPs), and IPPs).
4. The ownership of the entities involved in the transactions broken out by type of ownership. The ownership of the enterprise/establishment involved has an impact on prices used in international transactions (market price or transfer price)

Once the global production processes are characterized then the types of international flows that are taking place between the entities need to be identified. These flows will not only be based on change in ownership but will also be characterized by the process they are part of. These international transactions can be classified from the point of view of the principal enterprise/establishment in the national accounts of one country. Therefore, the following additional dimension should be added:

5. The type of international transactions recorded.

Figure 3 below adds the additional dimensions (dimensions 3-5, stated above) to the typology and can be used as a starting point in formulating a typology of global production arrangements.

**Figure 3. Types of global production processes and transactions involved\***

Description of production process from point of view of principal	Entities involved	Economic activity	Economic ownership of			Type of output	International transactions related to production process	Other international flows that need to be accounted for
			Materials	Intellectual Property	Output			
Outsourcing parts of manufacturing	Principal	Manufacturing	+	+	+	Goods	Goods for processing treatment: if good is returned to principal's country of residence, only the net value of manufacturing services will be registered as imports of service. Materials sent for processing are excluded from general merchandise exports; Goods returned after processing are excluded from general merchandise imports.  If good remains in supplier's country or sent to third country then recorded as exports of general merchandise from principal's country	Intellectual property owned by principal used by the supplier
	Supplier	Manufacturing service provider				Services	Exports of manufacturing services from supplier's country to principal	
Outsourcing parts of production of services	Principal	Production of services		+	+	Services	Exports of services (by type) from principal's country; imports of services (by type) from supplier's country	Intellectual property owned by principal used by the supplier
	Supplier	Production of services				Services	Exports of services (by type) from supplier's country to principal	
Merchanting	Principal	Merchant				Margin on Goods	For goods that do not enter the principal's territory gross value of exports from principal less value of supplier's exports (Goods under merchanting).  If goods enter the principal's territory then imports of general merchandise are recorded (value of supplier's exports)	Intellectual property owned by principal used by the supplier
	Supplier	Manufacturing	+	+		Goods	Exports of general merchandise from supplier's country	
Factory-less manufacturing	Principal	Factory-less production or acting as "converter"		+	+	Margin on Goods	For goods that do not enter the principal's territory gross value of exports from principal less value of supplier's exports (Global Production/Goods under merchanting).  If goods are returned to principal's territory imports of general merchandise are recorded (value of supplier's exports)	Intellectual property owned by principal used by the supplier
	Supplier	Manufacturing	+			Goods	Exports of general merchandise from supplier's country to principal	
"Factory-less" production of services	Principal	Factory-less production or acting as "converter"		+	+	Services	SNA global production/merchanting treatment:(gross value of exports of services from principal less value of supplier's exports of services)	Intellectual property owned by principal used by the supplier
	Supplier	Production of services				Services	Exports of services (by type) from supplier's country to principal	
Leasing of Intellectual Property or R&D	Principal	Supplying knowledge inputs		+		Services	Charges for the use of intellectual property	Intellectual property owned by principal used by the supplier
	Supplier	Manufacturing	+		+	Goods	Exports of general merchandise from supplier's country	
Management of manufacturing	Principal	Financial and business services				Services	None	Financial and management services used by the supplier
	Supplier	Manufacturing	+	+	+	Goods	Exports of general merchandise from supplier's country	
Management of production of services	Principal	Financial and business services				Services	None	Financial and management services used by the supplier
	Supplier	Production of services	+	+	+	Services	Exports of services from the supplier's country	

\*Based on in-depth review on global manufacturing prepared by Statistics Netherlands

## Outline of Chapter

- I. Overview of the global value chain and a description of the fragmentation of the production process.
  - a. Description of Gereffi's five types of global value chain governance
  - b. Description of Gereffi's three key variables dictating the organization of global value chains. The framework can be used to determine how much coordination is needed over the supply chain and how much risk each participating unit is accepting.
  - c. Each governance types comprise a spectrum running from low levels of explicit coordination and power between principals and suppliers
- II. Create our typology using guidance from Gereffi's framework but creating our own set of characteristics to define the various global production arrangements. Within this framework, determine the ownership of the materials, intellectual property, and outputs for the different types of global value chains.
  - a. Can ownership of material inputs vary by type of supply chain governance?
  - b. What if the principal owns some but not all of the material inputs? What would the industry classification be in terms of ISIC?
  - c. What if the costs of the material inputs are embedded in the contract manufacturing service fee? What would the industry classification be in terms of ISIC?
  - d. Factoryless goods producers undertake the entrepreneurial steps of the global supply chain but do not transform any of the material inputs. Is it appropriate to classify these units as traders?
  - e. Large scale turnkey projects delivered by project vendors (power plants, telecommunication networks, gas pipeline networks).
  - f. Fragmentation of the agricultural production process
  - g. Outsourcing of services
- III. Using information from section II, assign ISIC classification using the various possible engagements of a principal and a supplier (ownership of materials, IP, and outputs) as outlined in the 'In-depth Review on Global Manufacturing' and the more expanded figure 3 outlined in the issue paper.
  - a. The process is performed by a principal in one country and by a supplier in another country.
  - b. The relationship between economic activity of the principal and the supplier relative to the economic ownership of the material inputs, intellectual property, and outputs.
  - c. The type of output being produced (goods, services excluding intellectual property products (IPPs), and IPPs).
  - d. The ownership of the entities involved in the transactions broken out by type of ownership (parent-affiliate relationships). The ownership of the enterprise/establishment involved has an impact on prices used in international transactions (market price or transfer price). The collection of data and estimation may be slightly different.

e. The type of international transactions recorded.

IV. Specific Case studies-

a. Electronics/ computers

- i. Fabless semiconductor firms- outsource the fabrication of a chip to a foundry.
- ii. Apple, use i-Pod (or i-Phone) example developed by Linden et al or Xing and Detert - The well-known U.S. firm designs the i-Pod by combining technologies produced by others into a new innovative product. Apple conceives and markets the new product but does not manufacture the product.

b. Apparel-

- i. U.S. apparel firms engage in design, logistics, marketing, and sales activities. Almost all apparel production is done outside of the U.S. Increasingly, a “package contractor” takes responsibility for the financing and logistics involved in procuring the fabrics and other raw materials.
- ii. Sweden has agreed to contribute an apparel example

c. Motor vehicles and parts-

- i. U.S. firms engage in nearly all supply chain activities, though specialized firms provide logistics and other services. Auto production is mainly a regional strategy, tailoring the supply chain activities to produce cars for local markets within a region.
- ii. Sweden has agreed to contribute a motor vehicle example.

d. Cultural products– WTO

e. Legal Services or Architectural Services-

f. Agricultural products-

g. A franchise fee is paid for the brand name and concept- Israel coffee chain

h. Eurostat- Potential case studies from Eurostat.

Overlap with other sections-

How much should this section address the measurement issues that overlap with the other sections? This chapter is to address the conceptual issues and not delve into the measurement challenges.

1. How to determine economic ownership? This is addressed in chapter 2.

2. Complexity of affiliation- research on global value chains and the enterprise-establishment relationships of multinational enterprises.

a. How are data reported/recorded now?

b. Can new methods be developed using currently collected data to begin implementation of new standards?

3. Principal of residency and what transactions are identified on the domestic entities accounting records.



Key References/ information sources:

- U.S. International Trade Commissions “Economic Effects of U.S. Import Restraints, Special Topic: Global Supply Chains” August 2011
- Impact of globalization on National Accounts
- In-depth review on global manufacturing prepared by Statistics Netherlands (Mark de Haan)
- European Commission, International Monetary Fund, Organisation of Economic Cooperation and Development, United Nations & World Bank (2009) System of National Accounts 2008, United Nations (New York)
- Gereffi, G., J. Humphrey & T. Sturgeon (2005) The governance of global value chains, *Review of International Political Economy*, 12:1.
- International Monetary Fund (2009) Balance of Payments and International Investment Position Manual (BPM6), IMF (Washington D.C.)
- Linden, G., K.L. Kraemer, & J. Dedrick (2007) Who Captures Value in a Global Innovation System? The case of Apple's iPod. UC Irvine: Personal Computing Industry Center (<http://escholarship.org/uc/item/1770046n>)
- “How iPhone Widens the US Trade Deficits with People’s Republic of China” by Yuqing Xing and Neal Detert. December 2010 Asian Development Bank Institute
- Brown, Clair and Greg (2005) Linden “Offshoring in the Semiconductor Industry: A Historical Perspective.” Prepared for the 2005 Brookings Trade Forum on Offshoring of White-Collar Work

Role of co-contributors

*Israel, Netherlands, Sweden, Italy, WTO*

Co-contributors to this chapter will provide comments and possibly write specific sections of the chapter. In addition, co-contributors will provide specific case studies that illustrate various global production arrangements and how those arrangements are treated with regards to our typology.