

UNDERSTANDING UPGRADING USING VALUE CHAIN ANALYSIS

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Abstract

Globalisation in trade has provided many opportunities to firms but expanding global trade has also brought several threats. Global competitive pressures require firms to strategically plan for change continuously. This paper considers two systemic issues firms should consider when facing competition: first, companies do not innovate and upgrade in isolation and second, not only must firms innovate (doing things better than before) but they must target areas in which to upgrade (doing new things and doing things better than anyone else). The paper concludes by introducing a value chain framework that suggests an upgrading trajectory.

1. INTRODUCTION

Globalisation has provided the opportunity for an increasing number of producers to participate in the global economy. Firms from developed and developing countries are increasingly expanding activities to take advantage of the opening up of markets. Consequently, this expansion has heightened competition in domestic markets (from imports) and external markets. Thus, from the perspective of the firm, globalisation offers both opportunity and threat.

In order to take advantage of the opportunities presented by globalisation and to minimise the dangers of competition, firms need to innovate. But the pressures of competition are now so intense that merely improving the rate of innovation over historical performance is not adequate. Firms need to ensure that their rate of innovation is *faster than that of their competitors* – they face a moving envelope of “best practice”.

The growing globalisation of production has meant that firms are no longer connected to markets by the invisible and impersonal market forces described by Adam Smith and idealised in mainstream economic theory. Increasingly firms participate in managed value chains involving long-term relationships with suppliers and customers mediated by a range of price- and non-price factors. Increasingly these chains of production are also “governed” by key actors who play the twin role of connecting producers to final markets and ensuring that the whole chain of production achieves systemic competitiveness.¹ In the modern world of global competitiveness there is no gain in being an “island” of competitiveness in a “sea” of inefficiency.

The merging literature on value chains (Gereffi, 1994; Institute of Development Studies, 2001; Kaplinsky and Morris, 2001) tackles these twin problems – that is, how to achieve systemic competitiveness, and how to connect effectively to global markets. In so doing it both provides a framework for situating the upgrading challenges confronting the firm and helps to identify leading agents in this upgrading process. In Section 2 we review some of the historic literature on upgrading and then, in Section 3, we introduce an upgrading framework using a value chain analysis. Finally, in Section 4 we suggest a hierarchy of value chain upgrading, not in the belief that this is a necessarily sequential path for all firms, but rather one which provides a feasible trajectory, particularly for new producers entering the global market.

2. UPGRADING CORE COMPETENCES AND DYNAMIC CAPABILITIES

How would we know if firms have managed to innovate, or upgraded their activities? Two schools of thought have addressed this issue in recent years. The first has been that focusing on core competences (Hamel and Prahalad, 1994). The thinking here is that firms need to examine their capabilities to identify those of its attributes which:

- ❑ provide value to the final customer
- ❑ are relatively unique in the sense that few competitors possess them
- ❑ are difficult to copy, that is where there are barriers to entry.

¹ The concept of “governorship” was first introduced by Gereffi (Gereffi , 1994).

The capacity to innovate therefore arises from concentration in these competences and the outsourcing of those functions which do not meet these three criteria. A useful supplement to this line of thinking is that in a dynamic world, core competences can easily become core-rigidities (Leonard-Barton, 1995), and part of the task of upgrading is to relinquish areas of past expertise.

Closely related to this is a school of thought focusing on dynamic capabilities (Teece and Pisano, 1994). It argues that corporate profitability in the long run cannot be sustained by control over the market (for example, through using quasi-monopolistic practices), but through the development of dynamic capabilities which arise as a result of:

- the firm's internal *processes* which facilitate learning, including the capacity to reconfigure what the firm has done in the past;
- its *position*, that is its access to specific competences either within its own activities, or those which are drawn from the regional or national system of innovation and;
- its *path*, that is, its trajectory, because change is always path-dependent.

Both of these related concepts provide an important backdrop for understanding the phenomenon of upgrading. They are especially helpful in understanding the factors which both drive and facilitate improvements in product and processes which arise from the activities of the firm itself. But where they are weak is that they stop at the level of the firm, and fail to capture upgrading processes which are systemic in nature and which involve groups of firms linked together.

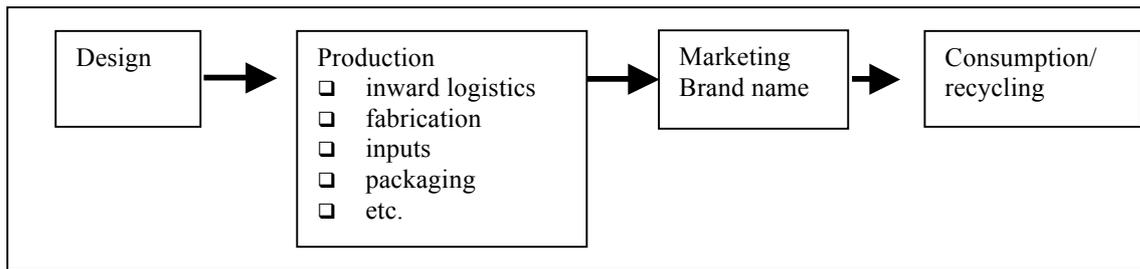
In order to understand how these systemic forces affect upgrading, it is necessary to enter into a brief discussion of the concept of the value chain, which has assumed increasing importance in recent years in the formulation of corporate and national upgrading strategies.

3. UPGRADING IN THE CONTEXT OF GOVERNED VALUE CHAINS

3.1. What are Value Chains?

The value chain describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use. Considered in its most elementary form, it takes the shape as described in Figure 1. As can be seen from this generic example, production *per se* is only one of a number of value-added *links*. Moreover, there are ranges of activities within each link of the chain (only those for production are detailed in the Figure).

Figure 1. A simple value chain



In the real world, of course, value chains are much more complex than this. For one thing, there usually are many more links in the chain. Take, for example, the case of the furniture industry. This involves the provision of seed inputs, chemicals, equipment and water for the forestry sector. Cut logs pass to the sawmill sector which gets its primary inputs from the machinery sector. From there, sawn timber moves to the furniture manufacturers who, in turn, obtain inputs from the machinery, adhesives and paint industries and also draw on design and branding skills from the service sector. Depending on which market is served, the furniture then passes through various intermediary stages until it reaches the final customer, who after use, consigns the furniture for recycling².

In addition to the manifold links in a value chain, typically intermediary producers in a particular value chain may feed into a number of different value chains. In some cases, these alternative value chains may absorb only a small share of their output; in other cases, there may be an equal spread of customers. But the share of sales at a particular point in time may not capture the full story – the dynamics of a particular market or technology may mean that a relatively small (or large) customer/supplier may become a relatively large (small) customer/supplier in the future.

3.2. Why are Value Chains Important in the Understanding of Upgrading Strategies?

Value chain analysis has two important elements which facilitate the understanding of the upgrading challenge:

- It helps to show how competitiveness is defined not only by the actions of an individual firm, but also by the tiers of suppliers and buyers who ultimately deliver the product to the final customer. As such, it provides a *taxonomy* for upgrading which incorporates not just the efforts of many linked firms, but also spheres of upgrading activity.
- It brings in *agency*, and in particular identifies the critical role played by leading firms which take responsibility for enhancing systemic chain competitiveness.

Let us consider each of these in turn.

² A detailed study about upgrading in the wooden furniture value chain is reported in Kaplinsky, R. M. Morris and J. Readman (2002), 'The globalization of product markets and immiserising growth: lessons from the South African furniture industry', *World Development* (forthcoming), Washington, D.C.

3.2.1. Value chain analysis and an upgrading taxonomy

One of the primary features of recent decades of globalisation is that as more and more countries have developed their capabilities in industrial activities, so barriers to entry in production have fallen and the competitive pressures have heightened. This has become particularly apparent since China, with its abundant supplies of educated labour and access to cheap raw material, entered the world market in the mid-1980s³. Consequently, it is increasingly the case that the primary economic returns in the chain of production are increasingly to be found in areas outside of production, such as design, branding and marketing. Value chain analysis provides not just a method of understanding these developments, but also a way of identifying key challenges in the promotion of upgrading.

The weakness of the traditional treatment of upgrading in the core competences and dynamic capabilities literature is that they stop at the level of the firm, and fail to capture upgrading processes which are systemic in nature and which involves groups of firms linked together in value chains. This is particularly damaging for the core competences approach which explicitly neglects the chain through its identification of upgrading with outsourcing.

Instead, we need to view the upgrading challenge in a wider perspective, capturing the central idea that it may involve changes in the nature and mix of activities, both within each link in the chain, and in the distribution of intra-chain activities. This relates both to the achievement of new product and process development, and in the functional reconfiguration of who does what in the chain as a whole. It is thus possible to identify four trajectories which firms can adopt in pursuing the objective of upgrading, namely:

- ❑ process upgrading
- ❑ product upgrading
- ❑ functional upgrading
- ❑ chain upgrading

The first two upgrading types are readily understood. What the value chain perspective offers here is the recognition that process and product upgrading increasingly involve integrated actions between firms in the chain. Functional upgrading – the third type of upgrading - is a little more complex, since it involves firms engaging in a different mix of activities, both within their individual link (or function) and perhaps by also moving to other links in the value chain.. Functional upgrading implies that firms are increasing, or moving into, new value adding activities. Finally, in some cases, barriers to entry in a particular chain may be so low that there are few prospects of upgrading. In this case, upgrading may imply the capacity to move to new chains. Figure 2 summarises each type of upgrading.

³ The share of exports of manufactured goods to total exports from China increased from 36% in 1985 to 85% in 1997. During this period, China's share of global exports of manufactured goods increased from 1% to 4% (UNCTAD, 2000).

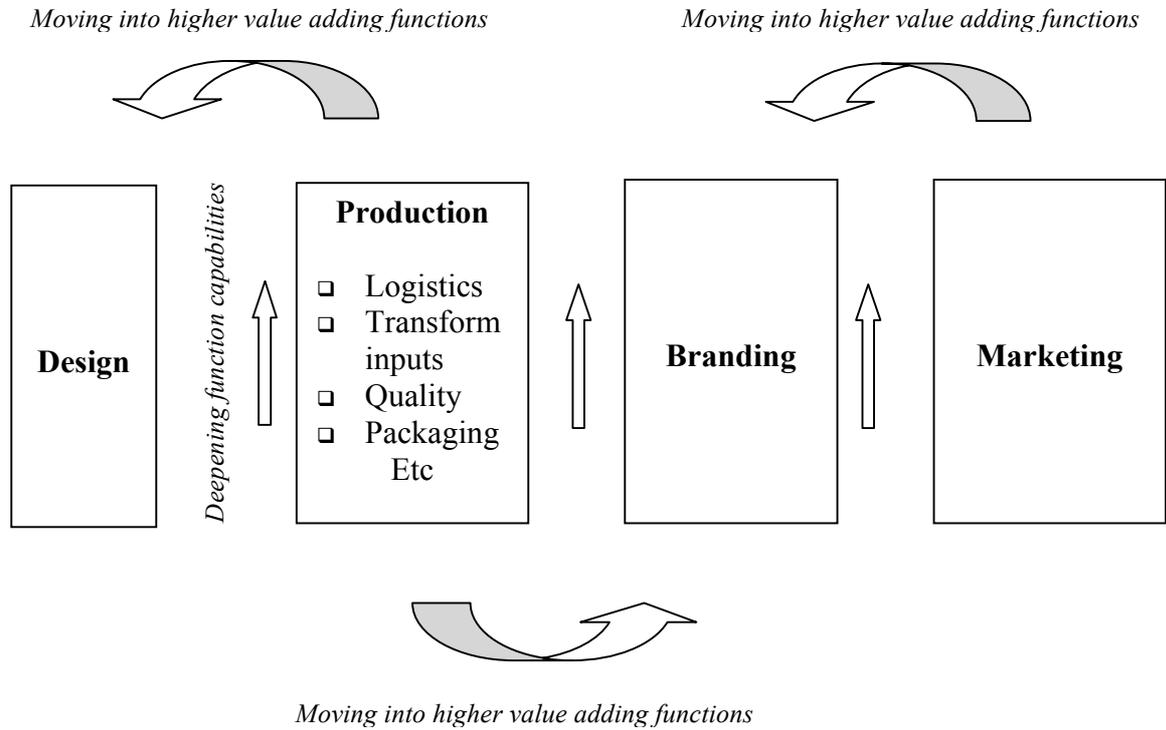
Figure 2. The Value Chain Framework: Four Categories of Upgrading

- ❑ **Process upgrading:** increasing the efficiency of internal processes such that these are significantly better than those of rivals, both within individual links in the chain (for example, increased inventory turns, lower scrap), and between the links in the chain (for example, more frequent, smaller and on-time deliveries)
- ❑ **Product upgrading:** introducing new products or improving old products faster than rivals. This involves changing new product development processes both within individual links in the value chain and in the relationship between different chain links
- ❑ **Functional upgrading:** increasing value added by changing the mix of activities conducted within the firm (for example, taking responsibility for, or outsourcing accounting, logistics and quality functions) or moving the locus of activities to different links in the value chain (for example from manufacturing to design).
- ❑ **Chain upgrading:** moving to a new value chain (for example, Taiwanese firms moved from the manufacture of transistor radios to calculators, to TVs, to computer monitors, to laptops and now to WAP phones)

Source: Adapted from Humphrey and Schmitz, 2001.

Functional upgrading, particularly, is increasingly becoming an important strategy for firms to follow should traditional business strategies such as price, quality or fast and reliable delivery become market qualifiers and no longer market winners (Hill,2000). In the contemporary global economy, functional upgrading implies the shift from control over embodied to control over disembodied activities. And such control requires a highly motivated and skilled workforce. Deepening the skills and knowledge of workers will be necessary if the existing functional activities have to be expanded. In the case of firms moving into higher value adding functions, new pools of knowledge – both technical and organisational - will be required. For example, companies may want to upgrade by moving from production to design (a higher value adding function). Competent design functions include high levels of technical skills such as CAD/ CAM competences and direct links to customers. Alternatively, firms may move from production to a wider customer awareness platform by launching a new brand name. Functional upgrading of this kind requires greater levels of knowledge about market segments and how to target customers effectively. In both cases, firms first have to recognise where value can be realised along the entire value chain. Figure 3 illustrates the two types of functional upgrading, namely, the deepening of existing functions and the moving into higher value adding functions.

Figure 3: Functional upgrading in the value chain



How might firms know if they had upgraded in the context of their value chains? Figure 4 (below) illustrates several examples as to how to go about identifying and measuring upgrading in a value chain. We first identify the types of upgrading in the value chain. This will include improving process efficiencies, and modifying existing or introducing new products. This type of upgrading focuses on deepening existing functional competences as well as moving into new and higher value added functions such as design and R&D. The final type of upgrading we consider is more strategic and involves firms moving into new value chains altogether. We have also related several examples of the types of practices and related performances which correspond to each type of upgrading (Camp, 1995).

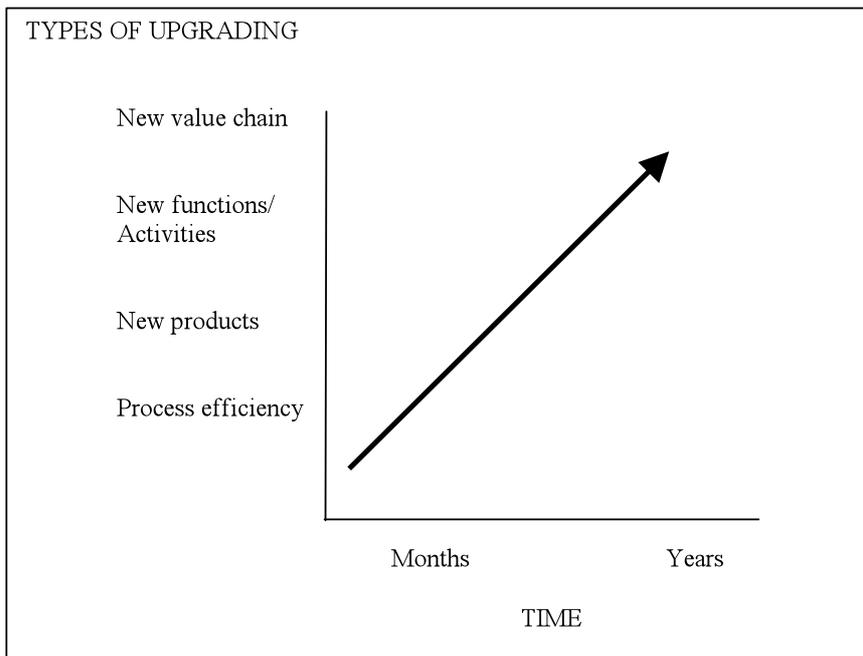
Figure 4. Examples of Indicators of Innovation and Upgrading: Practice and Performance

TYPE OF UPGRADING	PRACTICES	PERFORMANCES
1. IMPROVING PROCESS EFFICIENCY		
Within the chain link	R&D; changes in logistics and quality practices; introducing new machinery	Lower costs; enhanced quality and delivery performance; shorter time-to-market; improved profitability; enhanced patenting activity
Between chain links	R&D; supply chain management procedures; e-business capabilities; facilitating supply chain learning	Lower final product costs; enhanced final product quality and shorter time-to-market; improved profitability throughout value chain; enhanced patenting activity
2. INTRODUCING NEW PRODUCTS OR IMPROVING EXISTING PRODUCTS		
Within the chain link	Expansion of design and marketing departments; establishment or strengthening of new product development cross functional teams;	Percentage of sales coming from new products (e.g. products introduced in past year, past 2 and past 3 years). Percentage of sales coming from branded goods
Between chain links	Cooperating with suppliers and customers in new product development – concurrent engineering	Number of copyrighted brands. Increase in relative unit product prices without sacrificing market share
3. CHANGING THE MIX OF ACTIVITIES		
Within the chain link	New higher value added chain-specific functions absorbed from other links in the chain and/or low value added activities outsourced	Division of labour in the chain. Key functions undertaken in individual links in the chain
Between chain links	Moving into new links in the chain and/or vacating existing links	Higher profitability; increase in skill and salary profile
4. MOVING TO A NEW VALUE CHAIN	Vacating production in a chain and moving to a new chain; adding activities in a new value chain	Higher profitability; proportion of sales coming from new and different product areas

Two caveats are associated with the model presented in Figure 4. First, for upgrading to be effective, firms have to consider their internal assets and competences *and* the assets and competences utilised by suppliers and other agents connected in the immediate and secondary value chains. The second issue firms should be aware of when pursuing an upgrading strategy centres on the resources required. Investment in technology is an obvious requirement. But firms need also to consider organisational development enablers such as training, facilitating

learning environments and ensuring the support and commitment of senior management (Bessant, Brown, Francis, Meredith and Kaplinsky,2000). The final resource – and a resource that firms can only imprecisely manage - is time. Upgrading competences within and along any chain is time-based (Figure 5). Upgrading products and processes will generally be accomplished in a shorter period of time than the upgrading of functions or introducing new functions. And moving into a new value chain may take years or even generations.

Figure 5. Schematic time scale for upgrading



3.2.2. Upgrading and agency

A taxonomy for understanding upgrading is one thing. But who is to do what? The focus in existing literature on upgrading places the responsibility in the hands of the management of the firm (Tidd, Bessant and Pavitt,2001)Undoubtedly this is important. But what value chain analysis adds is the role of the key “governing” firm in each chain. This describes the role of leading firms who encourage/command improvements throughout the chain. Sometimes this is captured in the phrase “supply chain management”, where lead firms such both mandate performance requirements throughout the chain and assist their suppliers in upgrading (Bessant, Kaplinsky, Lamming, Ross and Vaughan,1999). But the concept of governorship is much wider than this and helps to explain the role played by three major parties in the upgrading process (Figure 6):

- ❑ those that mandate performance requirements along the chain (akin to the role of the legislature in political systems)
- ❑ those that audit performance (akin to the role of the judiciary in political systems), and
- ❑ those who assist firms in their specific upgrading activities (akin to the role of the executive in political systems)

Here value chain analysis adds value by separating out activities often conflated in the supply chain management literature. Value chain analysis also helps by identifying agents internal to the chain and those which are external to the chain.

Figure 6: Examples of legislative, judicial and executive value chain governance

	Exercised by parties internal to chain	Exercised by parties external to chain
Legislative governance	Setting standards for suppliers in relation to on-time deliveries, frequency of deliveries and quality	Environmental standards Child labour standards
Judicial governance	Monitoring the performance of suppliers in meeting these standards	Monitoring of labour standards by Non Governmental Organisations Specialised firms monitoring conformance to ISO standards
Executive governance	Supply chain management assisting suppliers to meet these standards Producer clusters/clubs assisting members to meet these standards Representative agents assisting members to meet these standards	Specialised service providers Government industrial policy support Producer business associations assisting members to meet these standards

4. IS THERE A HIERARCHY OF UPGRADING?

Is it possible to determine a hierarchy of upgrading? That is, does international experience suggests that firms engaging on an upgrading path are advised to proceed along a well-trodden path?

Much of the literature proposes such a trajectory (Gereffi, 1999; Lee and Chen 2000). It is one which begins with process upgrading, then moves to product upgrading, to functional upgrading and last of all, to chain upgrading (Figure 7). This accords with the common assertion that East Asian firms have made the transition from OEA production (original equipment assembling, that is, thin value added assembling under contract to a global buyer) to OEM (original equipment manufacturing manufacturer, that is manufacturing a product which will bear the buyer's badge), to ODM (own design manufacturer) to OBM (own brand manufacturing). Invariably this is a trajectory which involves a progressively higher content of disembodied, knowledge-intensive activities.

Figure 7. Is there a hierarchy of upgrading?

	Type of upgrading			
	Process	Product	Functional	Chain
Trajectory				
Examples	Original equipment assembly (OEA) ↓ Original equipment manufacture OEM	Original design manufacture	Original brand manufacture	Moving chains – e.g. from black and white TV tubes to computer monitors
Degree of disembodied activities	Disembodied content of value added increases progressively 			

If this hierarchy prevails, what importance does it hold for upgrading? First, the barriers to entry which define the envelope of profitable production are declining most rapidly in the embodied links in the value chain (that is, in regard to process capabilities). These are the areas most subject to competition and hence to declining terms of trade. By contrast, it is the disembodied activities such as design, marketing, technology and strategic repositioning where rents are appreciating and which are most difficult to enter and thus, which consequently offer the highest rates of return. The relative importance of disembodied inputs is, as a general rule, progressively more important as the challenge moves from process, to product, to functional to chain upgrading. Hence, to sustain income growth firms – either individually or collectively - will in the long run need to develop the capability to upgrade not just processes and products, but increasingly also their functions.

Secondly, there are important developments which have particular implications for new entrants, particularly in countries with little recent experience with global exporting. Hitherto, many global buyers have made it their business to help suppliers to upgrade, in order to ensure consistency of product and quality (see the various contributions in Gereffi and Kaplinsky (eds.), 2001). This has provided much hope for new entrants hoping to be integrated into supply chain management activities of trans-national firms. But, increasingly, efforts are being put into the development of global standards. These include the various ISO standards, but there are also industry specific standards such as Fords QS and VW's VDA6 standards in the auto industry, and HACCP (Hazard Analysis and Critical Control Point) procedures in the food sector. These provide for consistency and quality and obviate the need for buyers to upgrade their suppliers. They can then shop around for the least-cost global contract or "turnkey" manufacturers (Sturgeon, 2001), who invariably are established producers. This has been the trend in the electronics industry and is being replicated in other sectors.

Thirdly, the types of scale economies which arise in the value chain tend to differ with the degree of disembodied inputs into production (Kaplinsky, 1990). Where embodied inputs dominate, the major scale economies arise in production itself. On the other hand, disembodied scale economies involve minimum inputs of knowledge and these need not be firm- and/or location specific. Hence, insofar as scale economies require SMEs to cooperate with each other (to achieve what Schmitz refers to as “collective efficiency”) (Schmitz, 1995), the nature of this collaboration will tend to differ. At the early phase of the upgrading trajectory – where process upgrading is critical - the primary arena for cooperation is in production sharing or a division of labour in the production cycle (for example, firms making complimentary products or components for each other). But, as the upgrading frontier moves towards increasingly disembodied activities, SMEs require the skills to manage and share knowledge, rather than to cooperate in production.

Bibliography

Bessant, J., S. Brown, D. Francis, S. Meredith and R. Kaplinsky (2000). "Developing manufacturing agility in SMEs." International Journal of Entrepreneurship and Innovation Management 1(3).

Bessant, J., R. Kaplinsky, R. Lamming, A. Ross and R. Vaughan (1999). Using Supply Chains to Transfer Learning about Best Practice, Report to U. K. Dept. of Trade and Industry,. Brighton, Centre for Research in Innovation Management, University of Brighton.

Bulletin of Institute of Development Studies, Special Issue on "The Value of Value Chains", Vol. 32, No.3.

Camp, R. C. (1995). Business process benchmarking: finding and implementing best practices. Milwaukee, Wis., ASQC Quality Press.

Gereffi, G (1999), "International Trade and Industrial Upgrading in the Apparel Commodity Chain", Journal of International Economics, Vol. 48, No. 1, pp 37-70.

Gereffi, G. (1994), "The Organization of Buyer-Driven Global Commodity Chains: How U. S. Retailers Shape Overseas Production Networks", in G. Gereffi and M. Korzeniewicz (eds.), Commodity Chains and Global Capitalism, London: Praeger.

Hamel, G. and C. K. Prahalad (1994), Competing for the Future, Cambridge: Harvard Business School Press.

Hill, T. (2000). Manufacturing strategy : text and cases. Boston, Mass., Irwin/McGraw-Hill.

Humphrey J. and H. Schmitz (2000), Global Governance and Upgrading: Linking Industrial Cluster and Global Value Chain Research, IDS Working Paper 120, Brighton: Institute of Development Studies

Kaplinsky, R. and M. Morris (2001), A Manual for Value Chain Research, <http://www.ids.ac.uk/ids/global/>.

Kaplinsky R (1990), The Economies of Small: Appropriate Technology in a Changing World, London: Intermediate Technology Press.

Lee, J. and J. Chen (2000), "Dynamic Synergy Creation with Multiple Business Activities: Toward a Competence-based Growth Model for Contract Manufacturers", in R. Sanchez and A. Heene (eds.), Research in Competence-based Research, Advances in Applied Business Strategy Series, Vol. C, JAI Press.

Leonard-Barton, D. (1995), Wellsprings of Knowledge, Cambridge: Harvard Business School Press.

Lundvall, B. A, (1992), National Systems of Innovation, London: Frances Pinter.

Monden Y. (1983), Toyota Production System: Practical Approach to Production Management, Atlanta, Industrial Engineering and Management Press,

Nelson R. R. (1993), National Innovation Systems: A Comparative Analysis (New York, Oxford University Press. Addison 1995

Schmitz, Hubert (1995), "Collective Efficiency: Growth Path for Small-Scale Industry", Journal of Development Studies, Vol. 31, No. 4.

Sturgeon, T. J. (2001), "How Do We Define Value Chains and Production Networks", in Gereffi, G. and R. Kaplinsky (eds.) (2001), IDS Bulletin Special Issue on The Value of Value Chains, Vol. 32, No. 3., pp. 9-18.

Teece, D., and G. Pisano (1994), "The dynamic capabilities of firms: an introduction", Industrial and Corporate Change, 3, pp 537-556.

Tidd, J., J. Bessant and K. Pavitt (2001). Managing innovation : integrating technological, market, and organizational change. Chichester, Wiley.

UNCTAD (2000), Handbook of Trade and Development Statistics, New York: United Nations

Womack, James P., D.T. Jones, and Daniel Roos, (1990). The Machine That Changed the World: The Story of Lean Production. New York, Harper.