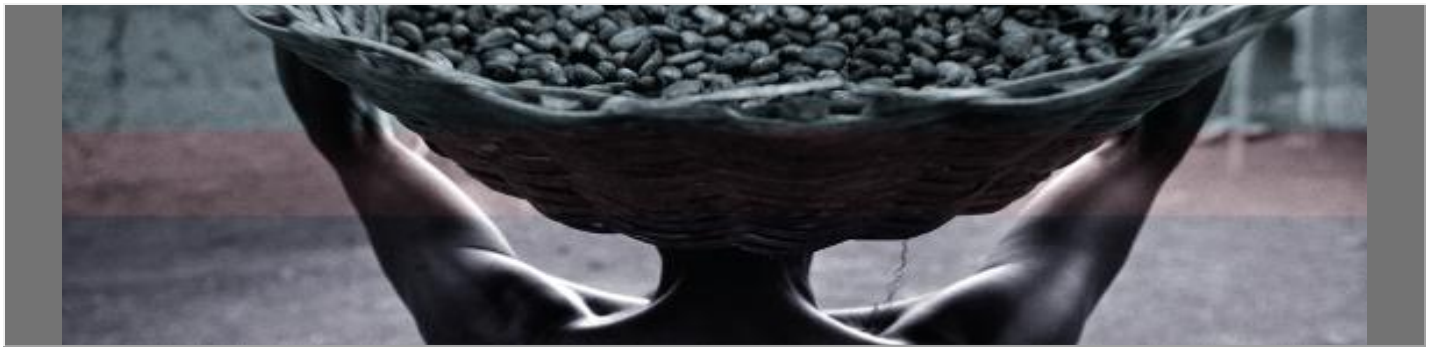

CAPTURING THE GAINS

economic and social upgrading in global production networks

New strategies of industrial organization: outsourcing and consolidation in the mobile telecom sector in India

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Abstract

The paper discusses the experience of the mobile telecom sector in India in terms of its business organization. There is a high level of outsourcing of activities, including those such as network management, which would usually be included within the core competence of mobile telecom companies. This outsourcing strategy, pioneered by Bharti Airtel, has resulted in considerable cost savings and increased profits for a small number of core employees of the lead firm. At the same time, in some outsourced activities, such as tower construction, there is a large incidence of casual and contract labour, all forms of precarious employment of the informal variety. However, because of the high level of oligopolistic competition among mobile telecom service providers, some of the benefits of lower cost have been passed on to consumers in the form of low-cost services. But the Bharti Airtel outsourcing strategy is important in pushing the limits of what could be called core competence in a business model dominated by outsourcing.

Keywords: Mobile telecom, industrial organization, outsourcing, impact on workers, profits, mobile phone users

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Abbreviations

ARPU	Average Revenue Per User
BPO	Business Processing Outsourcing
BRICS	Brazil, Russia, India, China and South Africa
CM	Contract Manufacturer
CMT	Cut-Make-Trim
CPRC	Chronic Poverty Research Centre
DFID	Department for International Development
DTH	Direct-to-Home
EMS	Electronics Manufacturing Service
ESRC	Economic and Social Research Council
FICCI	Federation of Indian Chambers of Commerce and Industry
GPN	Global Production Network
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GVC	Global Value Chain
ICRA	Indian Credit Rating Agency
IT	Information Technology
JV	Joint Venture
MNC	Multinational Corporation
MNO	Mobile Network/Service Operator
NCR	National Capital Region
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
PC	Personal Computer
SCI	Sustainable Consumption Institute
SIM	Subscriber Identity Module
TRP	Television Rating Point
UK	United Kingdom
US	United States

Introduction

It has been argued for several years now that the phenomenon of 'global production sharing' through global value chains (GVCs), around which a substantial literature exists, has helped developing countries expand export-oriented manufacturing activity. GVCs represent the significant unit of organization of international production, wherein 'lead firms', largely multinational corporations (MNCs), coordinate production across international borders through extensive networks of suppliers spread across large numbers of countries. This has resulted in a significant change in the structure of international trade, leading to a domination of what has been referred to as the 'trade in tasks', that is, trade is no longer characteristically undertaken in goods, but rather in particular production segments (cut-make-trim (CMT) versus the design brand market) of a production chain. The 'trade in tasks', empirically measured in terms of trade in intermediate goods, reflect this phenomenon, and the gains accruing to low- and middle-income countries in trade involvement are clearly seen here, with their share constituting more than 35 percent of the world's intermediate goods trade during the latter half of the 2000s (Milberg 2004).

However, it has also been noted extensively that, despite increases in export shares, involvement in GVC-coordinated activities has often not led to any significant increase in value added from those activities over previous commodity-based export regimes because lead firms in global production networks (GPNs) outsource lower value-added activities, while retaining control over production in the higher value-added areas of their 'core competency'. These areas, often characterized by higher technological and skill requirements, are also commonly oligopolistic and subject to significant barriers to entry, whereas the lower value-added segments of many GVCs have low entry barriers and constitute ongoing entry by firms into countries that previously did not produce those products (Milberg 2004; Milberg and Winkler 2010). To what extent is it possible for developing countries to counter the tendencies towards lower-end concentration in GVCs, often characterized by poor employment conditions and wage stagnation, which affects the standard of living of people engaged in the sector? To what extent is it possible to capture rents in different segments that allow for reinvestment, with this being one of the major challenges to longer-term economic development? Even if the former, commonly referred to as 'economic upgrading', happens, what is required for it to translate into social upgrading, or the expansion of employment accompanied by improvement in its quality?

In the above context, this paper examines the industrial organizational structure of the mobile telecom sector in India. The next section places the issue of industrial organization within the context of CVCs. This is followed by a discussion of the nature of mobile telecom in India.

GPNs and issues of industrial organization

The mobile telecom sector, taken as a whole, is an interesting one to analyse in this respect because its structure and evolution show up complexities that have perhaps not yet been analysed in GPN studies. First, the mobile telecom sector straddles manufacturing and services, with the production of a product (the mobile phone), the establishment of network infrastructure for the transmission of signals and the delivery of the service (telecom as well as various other value-added services) the main segments, of which the first and the third go into fulfilling customer service and satisfaction. *So, unlike most other sectors wherein firms would be engaged in either manufacturing activity or service provision, in this case the characteristics of both as well as the ability to combine both determine industrial organization in the sector.* This is significant, especially from the point of view of employment, because the question of whether tangible physical output is

being produced or not is important in determining the extent and kinds of work–worker–workplace dynamics that exist.

Second, in a sector like mobile telecom, the production of physical products and services entails technological requirements that are very wide ranging, from extremely complex and advanced to very simple, with structures of production and service provision consequently spanning a wide range as well. Industrial organization, with specific characteristics *vis-à-vis* the 'make-or-buy' decisions that firms take, governs the conditions of employment significantly in the sector.

Third, with production and service provision in mobile telecom being globalized from the beginning, the production system that has evolved has typical features of globalized production networks and has been one of the key areas wherein upgradation issues have been in the forefront from the outset, that is, where being part of the production system has been projected as a great opportunity for developing countries like India. Among the major advantages, employment, especially quality employment, is projected as one, but in this case specifically, employment issues cannot be studied without understanding the tendencies of industrial organization in the sector. At the same time, given that technology and design constitute significant components of the sector, issues of large-scale, heavy investments and the production and use of advanced technology result in a significant part of the production still being concentrated in the advanced countries, and also in a situation whereby the nature of markets has a very wide ambit, ranging between the advanced and the developing countries. Further, in a country like India, the nature of the domestic market and the presence of large domestic firms with significant market power affect the dynamics of value chain incorporation and the resultant employment conditions.

The first point that needs to be emphasized here is the following: *the nature of India's market is an important determinant of how the value chain or the production networks have emerged and is also an important example of how the sector has penetrated developing country markets.* As far as the consumer segment is concerned, the market (for mobile phones and for services) is characterized by high volumes, very low margins and potentially high turnover. Declining call tariffs in conjunction with favourable regulatory policies have led to a tremendous increase in the subscriber base, which has had a positive impact on industry revenues, but, simultaneously, operator margins have also shrunk, pulling down the 'average revenue per user' (ARPU). For example, the total number of mobile handsets in India was estimated at 881 million, of which 213 million were added only in 2011, indicating the high rate of market expansion. It is estimated that the domestic demand for handsets will touch 350 million units per year by 2020, and it has been predicted that the number of handsets exported during the same year will reach 300 million units. With India being the world's fastest-growing cellular market in terms of subscriber additions, the wireless subscriber base here is expected to reach 1.5 billion by 2020 (Sen 2012; Wilde and de Haan 2006).

In this context, developing countries are both lucrative as well as problematic destinations for the same reasons. As ARPU declines and voice gets 'commoditized', the challenge, as per industry documents, will be to retain customers, develop alternative revenue streams and create a basis for differentiation in the high-churning markets. However, the market consists largely of unsophisticated segments, wherein the largest numbers of customers in a country like India need low-end phones with basic services, and therefore large rents cannot be realized. *Thus, the mobile phone and telecom domestic market in India, as in many developing countries, is largely like that for cheap garments, despite the high levels of technological sophistication involved. This paper, while providing an overview of the whole mobile telecom sector in India, highlights this aspect by focusing on a unique total outsourcing model pioneered by Bharti Airtel in India.*

However, internationally, the way the sector has developed is that, over time, the highest rents are seen to accrue in generating value-added services and in producing high-value phones that can transmit high-end services. Therefore, it has been seen that, over time, MNC handset manufacturers as well as service providers focus on customer product design and outsource everything else, which is how they typically operate in other more sophisticated markets, and which is what determines their global strategy. Thus, even in a company like Nokia, the core firm specializes in customer knowledge and product development, even as it controls production facilities, which generate lower rents.

However, for a country like India, the handset manufacturers adopt a different strategy, that of capturing market share by reducing costs, on the one hand, and planning for exporting phones as well as telecom-related services from India, on the other. *Thus*, *the main issues with regard to upgradation possibilities is whether, despite the low-end nature of India's domestic market, India can become a centre where some of the higher-end telephones as well as higher-end services are produced, for a small segment of the domestic market as well as for the international market.*

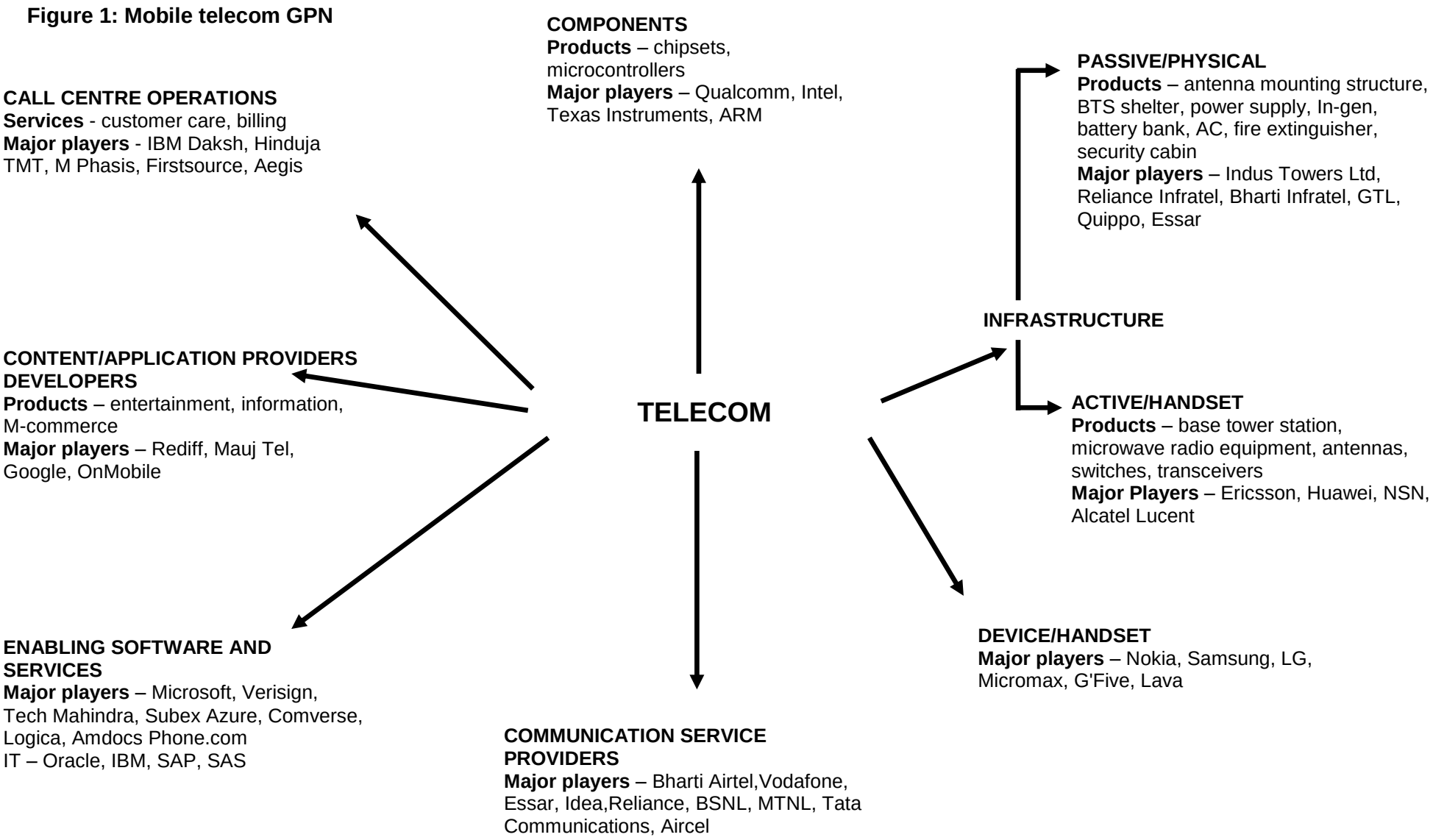
Despite the labour-intensive consumer goods type of market for mobile telephones and services in India, a large segment of the sector involves expensive and heavy infrastructure provision, in contrast with typical low-value consumer goods production, which necessitates the involvement of large infrastructure companies. In this situation, supervision, centralization of functions and largeness become crucial, making it a sector that is controlled almost entirely by large players, both domestic and MNCs. The second aspect we choose to highlight is the following: the strategy that has been evolving, thus determining industrial organization, is that of maximum outsourcing and capacity/network sharing, driven by the mobile service provider firms, combined with vertical specialization and consolidation across segments. The outsourcing and network-sharing strategy is one of establishing tie-ups between different large players in each segment, characterized by complexities that are hard to decipher.

What are the areas in which these tie-ups take place and what is the significance of these tie-ups between essentially large players for devising an industrial organization strategy? What is the role of smaller entities in this process and in the value chains or networks that are generated? In a sector that is technology-intensive and that also involves large and heavy infrastructure, how can industrial organization be such that it allows for maximum flexibility to cope with volatile, fragmented and varied markets? It is essential to answer these questions in order to determine the impact of this on labour processes and employment conditions. While attempting to answer these questions, the next section provides an overview of the entire sector.

The telecom production network

The telecom sector consists of a number of 'segments' that are interconnected through a myriad of relationships or multiple sub-chains, which function to bring mobile telecommunication devices and services to the customer. Overall, the sector is associated with high capital investment, high costs of running and maintaining networks and the need to maintain flexibility, given the volatile and globalized nature of markets. Figure 1 provides a pictorial overview of the sector. The key segments of the industry are components; infrastructure; handset manufacture; mobile service provision; and value-added services.

Figure 1: Mobile telecom GPN



Source: Representation by Anindita Chatterjee.

The ***components*** segment consists of products like chipsets and microcontrollers, which embody a very high-technology component of the sector and are entirely imported. Almost wholly dominated by foreign corporations like Qual Comm, Intel, Texas Instruments and ARM, the production for this segment is undertaken and controlled outside India, mostly in the advanced countries.

Handset/device manufacturers

The value chain of mobile phone manufacturing is a critical part of long and complicated chains, consisting of a variety of activities ranging from acquiring input materials and putting together hundreds of components and sophisticated software into increasingly smaller devices to distributing and marketing phones across the world. The manufacturing of each of these products occurs through networks of Original Equipment Manufacturers[1] (OEMs) like Nokia, Motorola, Samsung, LG and Sony-Ericsson, Electronics Manufacturing Services (EMSs) and Original Design Manufacturers (ODMs). The latter two types of companies are generally known as Contract Manufacturers (CMs)[2] (Wilde and de Haan 2006).

The leading device manufacturers in India are Nokia, Sony Ericsson, HTC, Motorola, Apple Inc. (Iphone), Samsung, LG and Blackberry. Of late, Asian players like Lava and Micromax (Indian) and G'Five (China) have also started capturing the market share. Most of the manufacturing and assembling takes place in three East Asian economies: China, Taiwan and South Korea. In 2010, more than a half of the total exports (58 percent) of the handsets was accounted for by these countries, indicating the importance of Asia in mobile phone GPNs. Mobile phone exports became more concentrated; the five largest exporting countries represented 74 percent of the world's exports (Lee and Gereffi 2012).

The level of outsourcing is considered low in mobile phone manufacture as compared with the manufacture of personal computers (PCs) in the literature. Despite the relatively low level of outsourcing in the mobile phone industry, the phenomenon is clearly on the rise. In a recent study of handset manufacturing, Lee and Gereffi (2012) note that fragmentation in mobile phone manufacturing is new, becoming significant only since the early 2000s, when lead firms, or OEMs, began to outsource or move manufacturing to locations outside advanced economies. Given rapidly changing markets and technologies, OEMs are under constant pressure to increase flexibility by scaling production volumes up or down and by reducing manufacturing costs. In this regard, outsourcing production to CMs (both EMSs and ODMs) has a number of advantages for OEMs, such as a reduction in production costs, allowing them to focus on the core competencies of marketing and sales, and accelerating their products' time to market. However, only a few countries and firms managed to upgrade economically in 'manufacturing hotspots' built around regionalized supply chains.

For developing countries, of which India constitutes one of the largest, major phone manufacturers have moved distinctly towards the production of low-cost handsets since 2006, thereby reflecting the industry's shift toward the low-end segment and low-cost geographies. When such production

[1] OEMs are companies that build products bearing their names.

[2] CMs offer full-scale manufacturing and supply chain management. EMSs are contract manufacturing services companies that produce the brand name products designed by the brands. EMSs do not own the intellectual property of the products they produce. Most EMSs are based in Western countries, but an increasing number of them are emerging in Asia (mainly China). Prominent examples of EMS are Flextronics and Hon Hai (Foxconn). ODMs, on the other hand, are manufacturers that both design and manufacture products.

facilities have been set up, it has been argued that India's low-wage cost advantage and favourable demographic profile (the fact that about half the population, which forms the prime low-cost working group, is below 25 years of age and can constitute potential domestic demand) are favourable factors allowing for the expansion of mobile phone production. Thus, *despite the general level of outsourcing being low, it is different with low-end production, as in the Indian case, where gradually handset majors are looking towards more decentralized production.* However, most of the production facilities are highly import-intensive and are in the nature of mere assembling plants, with very little component sourcing occurring within the country at the moment. Only electrical and mechanical parts are being locally sourced, whereas all the electronic components are imported.

Further, it is also a fact that leading firms display divergence in their GVC governance strategy, ranging from a modular form to vertical integration, and lead firms tend to capture the largest portion of value created in mobile phone chains while CMs and low-end component suppliers capture a much smaller share of value. Finally, *even in the successful production hubs in South-east Asia, it has been found that the relationship between economic upgrading and social upgrading, such as increasing wages, improving working conditions and promoting labour rights, has been limited* (Lee and Gereffi 2013).

Indian firms that sell mobile handsets under their own names, like Micromax, Karbonn and Lava, source their phone components mainly from China and assemble the phones in India. Major international manufacturers employ the same practice but the quality of their finished products is much better in comparison with the local/Indian brand names. However, mobile phones of Indian brand names and other 'Chinese' phones are cheaper (mostly with the same and sometimes even better features than the imported ones) and attract a large number of customers from low-income groups. For ease of understanding, we denote the major international manufacturers as 'Class I', and others as 'Class II'.

The exercise of a mobile phone reaching a customer is quite complex and depends on the demand for a particular brand. Normally, mobile phone shops are located in urban areas like cities and towns, which feed both urban and rural demand. The primary suppliers or the dealers (closest to the customer) are located in such places. National-level distributors are closest to the manufacturing firm. In between national-level distributors and city-/town-based dealers, there are sub-distributors or local distributors who handle bigger geographical markets (for states or zones). Sub-distributors are sometimes replaced by direct contact with dealers by national-level distributors in many cases, in order to save time and cost, for example in the case of LG.

All the Class I manufacturers depend on outsourcing the supply chain. For example, Nokia has HCL as its national distributor for India, whereas Samsung and Sony Ericsson have Ingram, HTC has Bright Point and Iphone is sold through Aircel in the National Capital Region (NCR) and by Airtel elsewhere. Class II manufacturers have set up their own distribution channels with smaller firms or depend on self-distribution. Onida and Videocon also follow this practice.

For Class I manufacturers, all the services related to mobile phones, like marketing, maintenance and the running of service centres, are handled by other firms. For example, the sales and marketing and service activities of Nokia phones are handled by HCL. City-based service centres, under the name 'Nokia Care', are given out as franchises. These employ local people to handle small problems, who are paid low wages. Serious faults in handsets are, however, handled by central offices that are managed by HCL.

The revenues for both national and local distributors are based on a system of sharing a small percentage of total sales (up to 5-6 percent of the total sales made). Dealers are incentivized through a system of slabs for a particular volume of sales plus a fixed amount by the national distributor. The system works a lot like the wholesale and retail business in other commodities.

Infrastructure

The ***infrastructure*** segment is what is known as the mobile networking segment, that is, the segment that makes the transmission of data and communication physically possible. Its constituents, in turn, are passive/non-electronic infrastructure; and active/electronic infrastructure. The components of passive infrastructure include antenna-mounting structures, base tower station shelters, power supply sources, DG set for power back-up, air conditioners, battery banks, invertors, fire extinguishers and security cabins, among others. The components of active infrastructure include base tower stations, microwave radio equipment, antennas, switches and transceivers. The major players in the infrastructure segment are NSN (Nokia-Siemens), Ericsson, Huawei, Alcatel Lucent and IBM, to name a few.

There are four kinds of operator models in the network infrastructure sub-segment of the industry, of which network sharing, exemplified by the third and fourth options below, is what is considered an innovation in industrial organization:

- The first is the infrastructure model with no sharing of resources among operators, with operators investing in infrastructure and managing it internally.
- The second model is one wherein infrastructure subsidiaries with 100 percent ownership are set up by a single telecom operator, with the subsidiary company building and managing tower infrastructure. The subsidiary company serves the infrastructure needs of the host (owner–operator) and tenants. For example, Bharti Infratel (excluding Indus Towers) is owned wholly by Bharti Airtel and has a tower portfolio of roughly 27,000 in number (ICRA 2009). Similarly, Reliance Infratel, owned by Reliance Communications, has a portfolio of 44,000 towers.
- The third model is one wherein an independent tower infrastructure company, jointly set up by a group of telecom operators, under a joint venture (JV) agreement, spins off an independent entity for managing tower infrastructure. Each operator contributes infrastructure to the JV and enjoys rights to shared resources. The independent entities are guaranteed occupancy from parent companies and also serve other entities. For example, Indus Towers is jointly owned by Vodafone Essar, Bharti Airtel and Idea Cellular, and has the largest tower portfolio in the country, of around 85,000 towers (ICRA 2009).
- The fourth model is that of independent tower infrastructure companies, which build and manage tower infrastructure that is leased out to operators under long-term contracts, such as GTL, Essar and Quippo. Some operators hive off their tower infrastructure to independent companies to unlock value. In 2010, Airtel hived off 17,500 towers to GTL and recovered nearly Rs. 8400 crores in the process (Business Standard 2010).

As stated earlier, the reason for the emergence of this system of network sharing is that mobile phone markets, which have traditionally been more of oligopolies, with their origins in industrialized countries, started experiencing increasingly intense competition as a result of which the per-minute prices earned have been continuously falling, which is not entirely compensated for by increasing mobile phone usage, thereby resulting in a decline in revenue per customer. Along with increased capacity requirements, this trend means that every mobile phone provider is being forced to cut

costs. With networks at the centre of the system and network infrastructure procurement costs accounting for an estimated average of about 60-80 percent of the total investment for a mobile phone company, network sharing has emerged as one of the strategies for cutting costs (ICRA 2009). Indus Towers, jointly owned by Vodafone Essar, Bharti Airtel and Idea Cellular, is an example of a venture whereby operators compete at the front end of the business, while cooperating in back-end operations, signifying a certain kind of 'cooperative competition' through network sharing.

It is argued that network sharing, wherein multiple mobile phone companies share common network infrastructure and operations[3], goes a step further than outsourcing. While outsourcing uses a classic customer service provider relationship, sharing requires companies to cooperate with their direct competitors to create shared synergies. Of course, a network provider can also initiate such shared usage. Sharing can result in savings not only on operating costs but also on most network investment expenditures.[4]

The phenomenon of network sharing for cutting costs is a significant means of generating flexibility within large-sized corporations, with implications for employment and labour conditions, as can be seen below.

Mobile communication service/network providers/operators

Another important type of company in the mobile phone industry is the mobile network/service operator (MNO).[5] Although MNOs, also known as mobile service providers, do not directly manufacture handsets themselves, they have a significant influence on the mobile telephone market because they provide the telecommunication service that allows people to communicate by using their mobile telephone handsets.

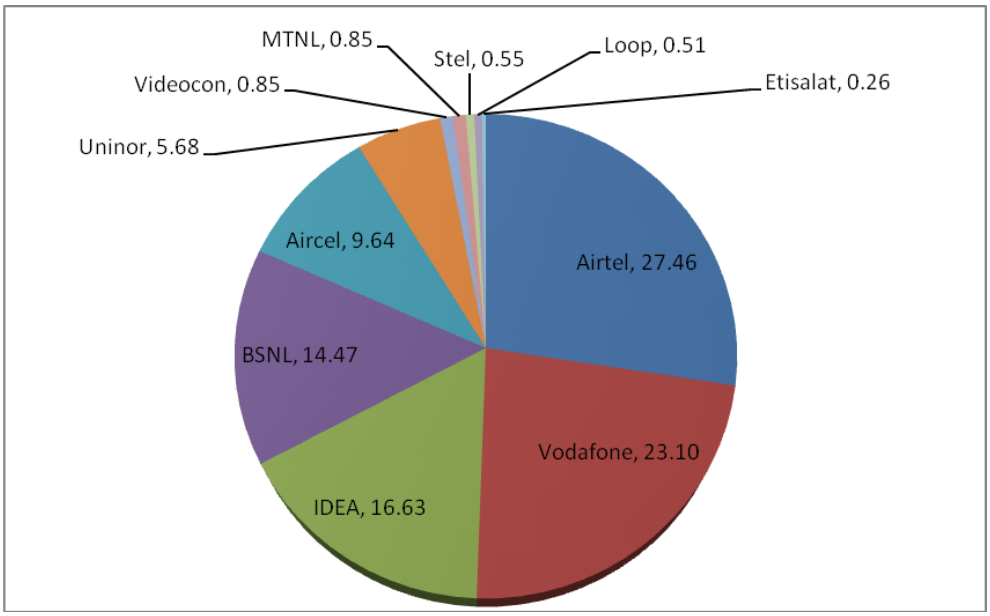
Often, mobile phone suppliers get into arrangements with MNOs, who are, in a sense, large-scale consumers (and resellers) of mobile handsets. As a result, though only a fraction of their revenues comes from handset sales, network operators often see handset manufacturers as their most important suppliers (Wilde and de Haan 2006), and this sets up inter-firm linkages between them, as between Tata Indicom and Samsung in India. In addition, internationally, a trend over the past few years has been the increasing involvement of mobile network operators in handset development. Mobile network operators such as Vodafone and Orange are increasingly bypassing the OEM node in the supply chain and using outsourced ODM production to market their own line of mobile phones.

[3] See http://www.oliverwyman.com/pr-117.html

[4] However, cooperating with competitors is fraught with many potential conflicts of interest that must be considered in the cooperative agreement. Sharing networks also requires defining the split for potential additional costs and depreciation as well as determining termination and compensation payments.

[5] MNOs, also known as wireless service providers, wireless carriers, mobile phone operators or cellular companies, are telephone companies that provide services for mobile phone subscribers. In order to become a MNO within a country, it is necessary to acquire a radio spectrum licence from the government. The precise spectrum obtained depends on the type of mobile phone technology the operator intends to deploy. For example, a Global System for Mobile Communications (GSM) network would require a GSM frequency range. The government may allocate a spectrum using whichever method it chooses, although the most common method is an auction.

Figure 2: Market shares of telecom operators, December 2011 (%)



Source: Cellular Association of India.

It is in this context that the supposedly unique 'Total Outsourcing' model – developed by Airtel first and now also being followed by Vodafone, Idea and other MNOs in India – acquires significance. Increasingly, since about the year 2005 or so, mobile phone companies have turned to far-reaching outsourcing agreements internationally to represent the entire technological make-or-buy value-added chain. In such agreements, typically, a single outsourcing partner, that is, a large corporation, handles the planning and design, development, operation and maintenance of the network. The mobile phone company retains authority over only the technology strategy and the determination of the quality parameters to ensure it maintains its competitive advantage over the long term. The arrangement between Price-buster E-Plus and Alcatel-Lucent, with the latter operating a large part of the E-Plus network as well as absorbing more than 750 E-Plus employees in Germany and H3G in Italy, became an important example of such an arrangement. While network outsourcing began with the networks of smaller mobile phone providers with 1-2 million customers, it soon became common even for the large operators with over 10 million customers, like the examples given above. It is argued that the key factor encouraging the trend towards outsourcing is the fact that large providers like Ericsson, Nokia Siemens Networks and Alcatel-Lucent, thanks to their increasing experience and order volume, can offer cost savings that are attractive for even large mobile phone companies. In the process, service providers are trying to ensure sustained cost savings over the long term via stringent process optimization based on international best practices, centralization of responsibilities and the associated improved utilization of employees and resources across countries and individual mobile phone companies.[6]

The Airtel 'total outsourcing' model in India, however, went further, making the strategy closer to that of a buyer-driven GVC type, with outsourcing involving several partners, on the one hand, and Airtel focusing exclusively on expanding its customer base, but not bearing the costs of large fixed investments in an otherwise technology-intensive and capital-intensive sector, on the other. This is discussed in detail below.

[6] See http://www.oliverwyman.com/pr-117.htm/

Total outsourcing: the case of Bharti Airtel

What does the total outsourcing model involve, in terms of the 'core' and 'non-core' functions of firms, costs and employment? The provision of the service of mobile telecom and other services delivered through companies like Airtel involves the following: (a) provision of enabling software and services, (b) content development/application provision, (c) call centre operations, wherein the services offered include customer care and billing, among others, and (d) network or infrastructure provision.

The core functions that are performed by a typical MNO like Airtel include the provision of 'mobility', that is, 'selling' a Subscriber Identity Module (SIM) – this means activation and deactivation of a SIM card and ensuring quality network coverage. It is also involved in providing 'solutions', that is, the MNO ties up with content developers to enable SIM cards to perform various tasks like monitoring the inventory, monitoring Television Rating Points (TRPs) and monitoring the Global Positioning System (GPS), among others. Apart from this, it is involved in 'branding', and everything else from the above list is contracted out. In other words, the only actual operations it gets involved in directly have to do with creating a customer base, ensuring falling caller fees for them and maintaining quality. Airtel first outsourced all business processes[7] to IBM[8] to manage. By using IBM's information technology (IT) infrastructure and standardized business frameworks, it reduced capital expenses and increased the quality of customer experience. Further, it outsourced telecom networks to Ericsson and Nokia. Ericsson agreed to receive payment through the usage of its network infrastructure instead of upfront payment. This again reduced Airtel's capital expenses. By adding new customers without having to incur increased fixed costs, Airtel reduced the service fee for its customers. In addition to network infrastructure outsourcing, arrangements have also been made with software service providers, including those providing 'value-added services'[9] (the major players include Microsoft, Verisign, Tech Mahindra, Subex Azure, Logica, CanvasM and Amdocs), content developers (like Rediff, Mauj Tel, Google, Onmobile), which provide services under three broad categories – entertainment, information and m-commerce, and call centre operators (like IBM Daksh, Hinduja TMT, Mphasis, Aegis, and Firstsource, among others).

A key feature of the Airtel outsourcing arrangement has to do with the payment structure for outsourcing. Rather than paying for services based on the number of hours worked or some other standard method, the payments to outsourcing partners are based on Airtel's revenue growth, which implies that, as it grows and the demands on its service providers expand, their compensation increases in lock step. Further, the customer base expands without necessitating any greater employment by Airtel, which has only a few hundred employees.

By undertaking the kind of outsourcing detailed above, the MNO, in this case Airtel, which was soon followed by others,[10] first and foremost reduces capital expenditures, as noted earlier. In the case of networks, it saved on the capital cost of the buffer of 30 percent it would otherwise have

[7] See: http://outsourceportfolio.com/benefits-of-business-process-standards-in-bpo/
[8] See http://www.scribd.com/doc/24805146/Bharti-Airtel-Case-Study
[9] Value-added services are supposed to constitute an area where there is great demand and which are expected to grow significantly. Examples of such services, produced by one of the value-added service provider firms, CanvasM, include Saral Rozgar – a platform where blue collar workers call in and get their resumes made and where interested employers can contact them; queue management solutions – a programme that can alert people with appointments about delays in case there is a long queue at a particular office; traffic alerts; and so on.
[10] For example, the following major outsourcing deals between MNOs and software providers in the past few years, following Airtel's lead, made news: (a) Vodafone outsourced its operations to IBM for $1.2 billion; (b) IDEA outsourced its operations to IBM for $0.8 billion; (c) Aircel outsourced to Wipro for $0.6 billion; (d) Unitech outsourced to Wipro for $0.5 billion; and (e) Tata Teleservices outsourced to TCS for $0.25 billion.

had to install. Instead of 32 million lines, including the buffer, it paid for only the 25 million lines it actually used (Subramanyam 2011). The network suppliers/managers must have managed to absorb this buffer cost because they provided similar services to other telecom operators and could use the higher volume to reduce total buffering, provided the buffering percentage required went down with higher volume.

Second, it expands its focus on customers and shares the revenue growth owing to its expanding customer base with the partners, thus incentivizing them. Third, it keeps employment to the minimum, with a small number of direct Airtel employees coordinating the tie-up with the partners and their large numbers of employees.

Fourth, it brings specialized knowledge into its operations. Instead of Airtel managing the network with its own engineers, whose knowledge would be limited, outsourcing network management brings in engineering services from manufacturers and suppliers. As the Chairman of Airtel put it:

> If something goes wrong with my switch, there's no way anyone from Bharti can do anything about it. An Ericsson guy is going to have to come and fix. I don't manufacture it; I can't maintain or upgrade it. So, I'm thinking, 'This doesn't really belong to me. Let's throw it out' (Sunil Mittal, quoted in Subramanyam, 2011: 404).

So, Airtel signed separate contracts with Ericsson, Nokia Networks and Siemens to set up and manage networks in various circles.

Fifth, it hands over management of a whole supply chain to a service provider. Before the IBM contract, Airtel had to deal with a dozen IT service suppliers – billing systems from Kenan Systems, customer care from Oracle, hardware management from Sun Microsystems and HP, storage systems from EMC, fraud management from Subex, data warehousing from NCR Terradata, interconnect systems from Intec and mediation systems from Hughes Software and Comptel (Subramanyam 2011).

A final aspect of industrial organization in sectors such as that of mobile telecom pertains to strategies for striking a balance between global and local markets, which is encouraging a growing number of companies to develop hubs that can provide shared services or resources for local, in-country operations. This means there are increasing levels of regionalization and not merely the typical GVC type of vertically disintegrated but connected kinds of production. Thus, with the advent of network sharing as well as full outsourcing, regionalization becomes important, leading to the provision of key functions such as procurement and finance being provided from the same hub, by grouping adjoining markets, yet still being close enough to the end customers to understand their specific needs and challenges. This has often resulted in mergers of different companies within large groups, which have had serious implications for employment. For example, Bharti Airtel, the key Indian example in the mobile telecom sector, embarked recently on a restructuring exercise to merge three separate businesses, its mobile, satellite TV (Direct-to-Home (DTH)) and fixed-line and broadband telemedia business, which jointly account for about 90 percent of the company's revenues and the vast majority of its workforce, into a single entity. It was being expected that Bharti's move could provide the trigger for similar action by rival corporations. It was also being predicted that the restructuring could result in 20-30 percent of Airtel's 16,830 employees losing their jobs.

It should be pointed out that the sharing of facilities, as, for instance, networks between different mobile telecom service providers, is not something confined to mobile telecom services.[11] In the manufacture of mobile phones, competitors such as Apple and Nokia share the manufacturing services of Foxconn. There are clear economies of scale at play over here. Network or manufacturing capacity sharing would seem to be becoming a feature of many players in both electronics and communications. Specialized service providers, whether of manufacturing services or network services, come up as the market expands and provides scope for a finer division of labour, as emphasized in Milberg and Winkler (2010).

In industrial organization terms, the Airtel 'model' has been vindicated because of its success in the market for mobile telecom services. Its subscriber base expanded rapidly from 2005 onwards, from about 714,000 subscribers in 2004 to more than 39,000,000 in 2007 and 184,550,000 in 2012. The financial statements for the company show a dramatic increase in several parameters that indicate this success from 2005, the year in which the outsourcing strategy was initiated. Thus, sales turnover increased from a meagre Rs. 63 crores in March 2004 to Rs. 8142 crores the following year, with the figure jumping by between 35 and 40 percent every year to touch Rs. 41,603 crores in March 2012. Similarly, operating profits, which stood at Rs. 27 crores in March 2004, jumped to almost Rs. 3,000 crores in the following year, with the most recent figures for March 2012 standing at more than Rs. 13,000 crores.[12]

This brings us to a key question: given the drastic changes in the industrial organization strategy in the mobile telecom sector, what is the impact on labour markets, employment and conditions of work? Has the growth of the sector resulted in social upgrading? This is discussed below.

Issues of employment and labour conditions

Given the above detailed structure, what is the kind of labour process that is employed in the different segments? It may be hypothesized that, for the largest part of the sector, the conditions of employment emerge as a residual, determined by the dynamics of inter-firm relationships between the different segments in the sector.

For example, given the need to 'centralize responsibilities' through outsourcing to large, established firms, it is an established practice to 'share employees' through a loose arrangement known as 'rebadging', wherein those employed in one firm get deployed into one where work is outsourced, allowing both firms to avoid longer-term commitments or payouts. This takes advantage of ambiguities involved with employer–work–workplace congruence, typified by service industries. Thus, when an MNO outsources its networking or customer service operations to other corporations, it is the practice to transfer employees as well. For example, Airtel transferred 1,000 of its engineers to the contracted network managers (Subramanyam 2011). In Africa, where Airtel is now a major player, it transferred its customer care staff to an Indian business processing outsourcing (BPO) firm, Spanco, in Kenya, where it (Airtel) is the second-largest mobile operator. Those transferred stated that the transfer was extremely quick and they were not given enough time to read through the contracts before signing. Despite assurances by Airtel that their benefits would be protected in the firm to which they were transferred, and that they could return to Airtel within two years if they were dissatisfied with the new company, in practice the employees were not permitted to return. In 2011, the transferred employees went on strike in the wake of a court case filed by 51 former Airtel employees against their transfer. Similarly, in the case of the merger

[11] I owe this point to Joonkoo Lee.
[12] All data are from the annual reports of Bharti Airtel, various years, as calculated by Balwant Singh Mehta.

cited in the previous section, Airtel has argued that retrenched employees would be allowed to move to its Africa destinations if they wanted, with perhaps similar ambiguities in practice.

In segments that involve physical production, employment arrangements are quite informal, reflecting general informalization trends in the economy. During our fieldwork, it was found that, even in the high-technology segment of infrastructure provision, like in tower erection for communication, the market for which, as detailed above, is controlled entirely by large players, the chain downwards is quite informal. Again, most equipment is imported, but local contractors are hired for actual jobs. For example, in a tower that was constructed for Vodafone by Indus in the Dwarka area in Delhi, where the total cost was reported to be Rs. 10 million, it was found that different contractors were employed to do different types of work. The entire set-up of a telecom tower is broken into segments and specific contractors deal with each of the segments. Earlier, service providers like Airtel and Vodafone dealt directly with them for such work, but now they have come under Indus, which erects and maintains the tower for them. Indus, in turn, pays less for doing the same type of work as compared with direct contracts with Airtel or Vodafone. For example, in the case of a small staircase, it was stated that it had to be constructed within a budget of Rs. 2,500 under Indus, whereas earlier the budget was Rs. 5,000 when the contractor dealt directly with the service provider. Each of these contractors who work for Indus and other infrastructure firms has multiple teams to work at different locations. On average, for those working on contract, the monthly wages are around Rs. 3,000-4,000, with some allowances.

An engineering company was undertaking the civil and electrical work for the tower. Three riggers were constructing the tower meant for placing antennas; they belonged to a different contractor firm. Workers were working with agility and skill but there was very low concern for safety, even though they were wearing safety harnesses. The wages were being paid on a daily basis, amounting to Rs. 150 per day. Various towers are worked on simultaneously, and there are many teams (15 for Delhi for the particular contractor we contacted) under the contractor working on towers at different locations, with each having two to three riggers. There was a technician for every 15-20 towers, again employed informally for Rs. 4,000-5,000 per month, to troubleshoot problems. In some cases, brick kiln workers, who are used to climbing great heights, are specifically used for the difficult jobs. Engineers, who work as labour contractors, agents and installers, are often hired for Rs. 5,000-7,000. Thus, it appears as if the telecom infrastructure set-up, on the ground, functions just like the construction industry elsewhere.

We also conducted interviews at Airtel and Vodafone, to get an idea of how the value chain in mobile telecom functions. An interview with a dealer of SIM cards revealed the following supply chain – from the mobile service provider to the distributor to the local dealer, for both the purchase of SIM cards and the recharge of the balance. To elaborate – in the case of the latter (recharge of talk time), the distributor gets a talk time to the tune of Rs 0.5-0.6 million deposited in his or her cell phone account from the service provider, which then is sold to local dealers. A dealer may buy talk time worth, say, Rs. 10,000. He or she deals with an agent of the distributor, who collects the money and deposits the talk time. The process works on commission. The dealer's commission is roughly 2 percent, while that of the distributor is about 1 percent. It appears that distributors operate on the basis of areas, with a cluster of areas making up the zone of a distributor.

In the case of selling a connection (SIM card), the chain remains the same while the reward for the local dealer is apparently different. Selling a SIM leads to a 'point'. And then the collection of a particular number of 'points' (say, about 0.2 million points) entitles the dealer to a particular product like a camera or a bike.

Clearly, there is no evidence to show any substantial social upgradation as a result of participation in the telecom sector. There is a substantial growth of employment with the rapid expansion of the telecommunications sector, and wages too have increased in this sector (see data in Sarkar et al. 2013). But the varieties of outsourcing result in the spread of precarious forms of employment, contract and casual labour or informalization of employment across various segments of the labour market. Given the prevalence of such a structure, combined with the perceived vulnerabilities of operating in low-margin markets such as India, it is the labour market that provides the guarantee of maximum flexibility. However, centralization necessitates the employment of large workforces and, consequently, labour process control, employment flexibility and increased automation, among other things. In other words, with the characteristics of service provision requiring large numbers of 'feet on the ground', the conditions of employment are informal, to a very large extent. This hypothesis needs to be looked into with systematic research in the different segments, however.

At the same time, the cheapening of mobile phone service provision has clearly been of great benefit to the Indian consumer and has driven the unprecedentedly rapid expansion of mobile phone services. In this manner, because of oligopolistic competition among the handful of telecom majors, at least some of the benefits of outsourcing have been passed on as consumers' surplus to hundreds of millions of Indian users of mobile phones. This, in turn, has made its own contributions to economic and social development in the country, including rural India, as discussed in a companion study by Mehta (2013).

Conclusion: what are the limits of outsourcing?

The Airtel outsourcing model brings up an important question of industrial organization in GVCs: what are the limits to outsourcing? Following the analysis of Prahalad and Hammel (1990), outsourcing was supposed to be about everything other than a firm's core competence. Manufacturing, for instance, has been separated from design, branding and marketing in many consumer products, such as garments and shoes. But the continued codification of substantial parts of knowledge, along with the modularization of tasks (Contractor et al. 2011) has made it possible to finely slice what were integrated tasks into parts that could be outsourced. For instance, in the research and development processes in pharmaceutical companies, 'knowledge-intensive projects are more likely to be assigned to internal teams, while data-intensive projects are more likely to be outsourced' (Azoulay, 2004, quoted in Contractor et al. 2011: 26). In contract manufacturing, as is ubiquitous in consumer electronics, lead companies keep design, branding and marketing to themselves, but outsource all manufacturing.

The modularization of tasks in providing telecom services (network management, IT service management) has made it possible to outsource what would earlier have been considered part of the telecom service providers' core activities. Managing networks and IT services were considered part of the skills that constitute a telecom company's core competence. But the Airtel example shows that even these services could be outsourced. The telecom service provider could then further narrowly define itself as one that owns the bandwidth and manages the bundle of services that provide mobile telecom. Of course, there would be limits to outsourcing, and the factors determining those limits need to be explored. But the point here is that the Bharti Airtel networking model has pushed the limits of outsourcing in mobile telecom to a new level.

A final point: what does the outsourcing of such critical parts of GVCs mean for national development, when the firms are MNCs of various origins?[13] This question of national development is complicated by the fact that companies such as Bharti Airtel are themselves new multinationals from among the emerging BRICS (Brazil, Russia, India, China and South Africa) economies. The decisions of such new MNCs do not seem to take account of national development concerns; rather, they are business decisions based on cost reduction considerations. It is worth noting that, in providing IT services, Bharti Airtel preferred not one of the Indian IT companies but IBM. The forward linkages, in provision of higher-level expertise, and backward linkages, in providing hardware, are to IBM in the US. Such backward and forward linkages in GVCs have national development implications, but these obviously do not enter into firm-level calculations. This raises major issues about the nature of development policy in a wildly outsourced world.

[13] This point is also owed to Joonkoo Lee, in his review of the draft of this working paper.

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