

China's Telecommunications and IT: Planning *and* the WTO?

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China's leadership clearly sees the potential that ICTs offer to create a networked society and help leapfrog China's development. (Dahlman and Aubert (2001) World Bank, p.91)

Introduction: From Plans to Markets

The basis of political economy in China since 1949 has been one party state-directed economic and social development. In her critique of Marxist economics, the Cambridge economist Joan Robinson took the view that for developing countries, centrally-planned or administered economies – centralization was assumed to be a necessary if not a sufficient characteristic of the Marxist political economy – were probably cost-effective in mobilizing the economy's surpluses in the early stages of industrial development, but became less so as development proceeded. (See Robinson, 1978). It is interesting to place the development of China's telecommunications sector and the application of ICTs within China, inside this perspective.

China's telecommunications sector became a beneficiary of the state-directed approach in the 1980s as national priority was assigned to it. (Ding Lu, 2000; Lovelock, 1998; Mueller and Tan, 1997; Ure, 1995, 1997) By the early 1990s a degree of local autonomy had been introduced, allowing the local Posts and Telecommunications Administrations (PTAs) greater management flexibility in planning, investment and tariffing policies.¹ By early 2000s China's commitment to joining the WTO has thrown the administration of telecommunications services into a market mode. This has several sides to it. Sources of investment are changing, resource-planning management is undergoing radical changes as the industry restructures, and tariffing policies have shifted away from transfer pricing and closer to cost-based pricing. Yet China remains committed to a 5-year planning process that includes industrial policy to develop its hardware and software sectors in information and communications technologies (ICTs) and a national information infrastructure that includes among its goals access in the under-served central and western provinces. To what extent does simultaneous WTO membership and its

¹ Installation charges sanctioned by the State Council in 1980, and put on a full cost basis from 1990, generated over one-third of the Ministry of Posts and Telecommunications (MPT) revenues for re-investment in the network during the 1990s. The 'three ninety per cents' (of profits retained, of foreign exchange retained and of central government investment non-repayable) which lasted from 1985 to 1994, was another source of retained earnings to finance investment. Throughout the 1990s, foreign funds, such as soft loans and vendor credits, never rose above 15 per cent of total investment. Also (see Mueller and Tan, 1997, chapter 2) in the 1980s the Post and Telecommunications Administrations (PTAs) introduced the contract responsibility system for senior and middle management and tied the wage fund to levels of profitability.

commitments and 5-year planning together with industrial policy present a circular problem that needs to be squared?

This paper, while not comprehensive, will examine some of the issues arising from this question.

WTO Membership, ICTs and Five Year Plans

The Ministry of Information Industries

In response to accession to the WTO on 11 December 2001, minister Wu Jichuan of the Ministry of Information Industries (MII), announced the rescinding of two regulatory instruments, the 11 September 1993 'Provisional Approval of Management Methods of Open Telecommunication Operations Affairs' and the 10 November 1995 'Provisional Market Management Requirements for Open Telecommunication Service Markets.' Under these two regulations the MII and its forerunner, the Ministry of Posts and Telecommunications (MPT), had kept foreign direct investment (FDI) out of the sector. On 1 January 2002 the 'Telecommunication Enterprise Management Regulation for Foreign Investment' came into effect, having been signed off by Premier Zhu Rongji as chairman of the State Council's recently formed Commission for Information Industries, a policy-making body set up to coordinate the development of the national information infrastructure. We may note two aspects from these announcements. First, the dates of the now rescinded original regulations and second, who signed off on the announcements.

The early-mid 1990s was a period of increasing competition between Chinese ministries and commissions at national level, and between municipalities and state-owned enterprises at provincial levels, for a slice of the pie of the lucrative information and communications technology (ICT) sector in China. (See Lovelock and Ure (1998) for a discussion of a bargaining model in China's telecommunications industry.) 1993, the year of the first set of regulations designed to prohibit FDI in telecommunications,² was also the year in which Hu Qili, the influential minister of the Ministry of Electrical Industries (MEI) presented the Golden Projects proposal to the State Council. The adjective 'golden' is regularly used in China to denote a project of special importance, which has state backing. The original Golden Projects included the Golden Card (debit cards), the Golden Gate (or Customs), the Golden Bridge (a nationwide data network) and the Golden Sea (to place the Party online).³ By 1998 there were upwards of twenty such 'golden projects'. This was also the same year the commission appointed by vice-president Al Gore in the USA reported back on the recommendation to build America's information superhighway. *The National Information Infrastructure: Agenda for Action*,

² Insofar as the MPT anticipated new entry from Chinese state-owned enterprises into the telecommunications market, the restrictions on foreign direct investment can be seen as self-serving as limiting access to foreign funds would be more harmful to new entrants than to the incumbent operator. However, it is believed that minister Wu's opposition to FDI also sprung from more fundamentalist objections.

³ At the time the Golden Sea project was treated as a not-so-closely-guarded secret. See Ure (1994) p.193, for the first reference, and for use of a bargaining approach to the industry, and the prognosis that competition would mostly likely first come from domestic sources.

Executive Office of the President, Washington D.C., 1993. Soon the Golden Projects were being discussed as components of China's national information infrastructure (see Ure and Liang, 2002) with the telecommunications network very much the bedrock of the CNII.

The MPT soon set upon building a nationwide grid of eight optical fibre cables running roughly north-south and east-west, and a complete overhaul and upgrade of the national switching system, phasing out lower-level switches and launching an aggressive programme of replacement of analogue with digital switches.⁴

Meanwhile the MEI grabbed the lead role in the Golden Projects, establishing a Golden Projects office within the ministry, and was the chief instigator of two new state-owned enterprises, the JiTong Corporation and LianTong, renamed China Unicom. JiTong was given responsibility for the Golden Bridge project, while China Unicom was officially promoted to provide public telecommunications services where the MPT's operational arm, later renamed China Telecom, was unable to provide service within three months of a customer's application. Almost immediately the MPT's Directorate-General of Posts and Telecommunications responded with claims that service could be provided within the three-month period in major markets, which of course were the profitable urban areas. The threat of domestic competition clearly galvanized the MPT into a flurry of investment on the one hand and typically protectionist and obstructionist activity towards China Unicom on the other. (See ITU country interconnection studies on China at: www.itu.int/interconnection. See also Zhang (2001) fn. 28).

When, in 1998, the MII was formed and absorbed the MEI it appeared a victory for the old MPT and for minister Wu in particular, especially as his eventual appointment as new minister came after months of reported opposition from premier Zhu who clearly favoured a more open and competitive environment within the sector. China's efforts to join the WTO were already well established and premier Zhu's domestic programme of financial, industrial and market reforms was struggling to make progress. In this light, China's success in joining the WTO can perhaps be best judged in terms of finally and decisively swinging the domestic agenda behind the position of premier Zhu, and President Jiang. It is therefore symbolically apposite that Minister Wu it was who signed off on the two restrictive regulations of 1993 and 1995, and premier Zhu it was who signed off on the new regulation opening the sector in conformity with China's WTO commitments.

The Commission on Information Industries

The establishment of the Commission on Information Industries in 2001 with premier Zhu in the chair is particularly interesting, partly because it represents a certain continuity and partly because it represents a radical departure. In 1966 the State Council established a National Committee for the Informatization of the Economy, chaired by vice-premier

⁴ This old mesh architecture has since been superseded. In 2001 China Telecom began upgrading the trunk backbone transmission network, deploying dense wave divisional multiplexing (DWDM) over three (northern, southern and western) fibre loops offering gigabit speeds.

Zou Jiahua,⁵ and this signified the importance being given to the development of a national information infrastructure by the Party and the government. It was also the means by which contending interests in competing ministries and commissions could be assembled to achieve a bargaining consensus. The Committee was an umbrella organization that could use its authority to prod ministries in different directions. For example, the MPT came under pressure from the interests around China Unicom to require China Telecom to provide interconnection. On the other hand, minister Wu was eventually able to convince the State Council that the arms-length foreign investments China Unicom managed to arrange through a series of China-China-Foreign joint ventures were strictly illegal because by regulation they were not supposed to include installation fees in the revenue-sharing agreements. Without revenue from installation fees these joint ventures, over twenty of them across the country, proved unsustainable. The need to bring the different ministries and commissions together reflects the essential 'convergent' nature of the ICT sector, and seemingly can only be met at the State Council level of authority. In this sense the Commission on Information Industries is the successor of the Committee on the Informatization of the Economy.

In another sense the Commission on Information Industries is a break with the past. This is true in the most obvious case of the regulation opening the telecommunication markets to foreign direct investment in conformity with China's undertakings for WTO membership. The Commission is very much premier Zhu's vehicle for driving through changes that had been opposed quite vocally by minister Wu and his conservative allies.⁶ In that sense it is not consensus building, it is decisive in relegating the role of the MII.⁷

This was starkly apparent when the Telecommunications Regulations, issued September 2000, preparing the way for WTO compliance, failed to mention the MII as the regulatory agency for the sector. At time of writing it remains unclear which body or organization will take on the regulatory role, although it seems as if it may be at the State Council level. A large part of the MII's work since 2001 has been devoted to redrawing the regulations and rescinding the out-of-date ones, thereby setting the scene for whoever takes overall responsibility. Minister Wu's impending retirement will then bring one era to a close and premier Zhu's retirement will mark the end of the beginning of the next. So, although consensus building is always an important aspect of policy-making in China, and minister Wu is a member of the Commission, the specific role of the Commission seems more focused on the issue of convergence.

⁵ This was an upgrading of the Joint Conference on National Economic Informatization to the status of a Leading Group.

⁶ I use the term 'conservative' only in the sense of a position to conserve what minister Wu and like-minded allies within the Party and the State apparatus perceived to be the advantages of a planning process that retains an emphasis upon national self-reliance.

⁷ Rumours circulating in, and maybe fed to the Chinese press during the year were forecasting the demise of the MII altogether, with responsibility for national telecommunications resource planning being passed to the State Development and Planning Commission. See *Homeway Financial News*, 16 July 2001, cited in MFC Insight Update (www.mfcinsight.com)

The most prominent case of convergence is that of the radio, film and television sector. The State Administration for Radio, Film and Television (SARFT) has an opportunity to upgrade its cable networks to provide cable telephony and IP telephony,⁸ and when it became an investor in China Netcom - formed totally outside the auspices of the MII with powerful backing of the Shanghai municipal government, the China Academy of Social Science and the Ministry of Railways - SARFT was throwing down the gauntlet to the MII.⁹ In 2001 Minister Wu moved to crack down on any circumvention of his powers by issuing a regulation that required a cable enterprise to have a licence from the MII before it could offer telephony. In December 2001 SARFT announced that it was placing all its cable assets under a new corporation, the China Radio, Film and Television Group (CRFTG), a first step perhaps towards mimicking the AOL-Time Warner and News Corp conglomerate models.¹⁰ There could be strong support within the State Council for creating such a conglomerate, especially if it implies a critical mass for local Chinese content production to ward off the competitive threat of foreign imports, but also because it may be seen as a vehicle for directly regulating content and as a distribution channel for foreign content which is then charged fees. But an equally and probably more compelling development is centrifugal, with major metropolitan areas developing their own local content production houses and distribution channels, consisting of broadcast, cable and digital subscriber line (DSL) systems, including broadband web-casting.

The convergence issue is one that may well require decisive action rather than time-honoured consensus¹¹ because the inefficiencies of non-interoperability, of incompatible standards and systems, and of lengthy delays due to cross-ownership or cross-regulatory disputes are not consistent with a planning approach.¹² Convergence in this context refers to the ability to access or deliver a set of services, such as telephony, television, streamed video, Internet, online information services and games over the same transmission system.¹³ China also has a firm commitment to industrial policy in the ICT field that

⁸ According to Dahlman and Aubert (2001, p.92) only 10 per cent of China's cable networks are currently capable of carrying two-way traffic.

⁹ The folding of China Netcom into a consortium with China Telecom (North) is just a further twist in the range of alliances that may emerge.

¹⁰ A problem for SARFT and CRFTG is that many of China's cable networks are owned and run by municipal authorities so that major cities have two non-interoperable analogue cable systems. This brings national-local rivalry into play. Another problem is that while control of content is being concentrated in the hands of CRFTG, SARFT's 32,000 km fibre optic network is operated by the China Cable Network Company (China Cable), thus threatening to replicate the SARFT versus MII clash of interests over who owns what, who offers what, who bills the customer, and who collects the revenue?

¹¹ The Shanghai municipal government took the decisive approach when the cable and telecommunications networks were instructed to offer joint services in the city.

¹² An insistence on 'Chinese walls' between the telecoms and cable industry have been blamed in America for the apparent failure of the Telecommunications Act, 1996 to generate investment in broadband connections over the 'last mile' to homes and offices. See *Asian Wall Street Journal* editorial, 25 February 2002.

¹³ Convergence represents a business opportunity where a market can be created, but a business threat where it implies substitution. For this reason a logical development in the media sector is

includes microcircuits, software operating systems, network equipment, access devices and the like, so by insisting on convergence at the service level China could use this as a springboard for developing its own standards across a range of industries and products. Two prominent examples of this are China's efforts to develop its own standards for third generation mobile phones and for digital terrestrial transmission for television broadcasting. So the setting up of the Commission for Information Industries is significant in a way that the setting up of the Ministry of Information Industries was not. The former tackles the issues of convergence, the latter did not.¹⁴

Before leaving the role of the Commission on Information Industries it is worth noting that among its members is president Jiang Zemin's designated successor, vice-president Hu Jintao and vice-premier Li Langqing.¹⁵ The Commission is served by an Office of Information Industries headed by Zang Peiyan, head of the State Development Planning Commission who is charged with implementing the policies of the Commission. How long lasting the Commission will be is in doubt, as 'Leading Groups' typically get formed to 'get things done' before handing off to other organs of the state, but by the end of the 10th 5-year plan in 2005 it is likely that a new regulatory body will be in existence to oversee the information industries and the convergence of ICTs. This raises questions over the future of both the MII and SARFT. As we noted above, the draft Telecommunications Law released before China's WTO membership was finalized specifically failed to mention the MII by name when referring to the 'telecommunications regulator.'

The 5-Year Plans

On the face of it, state planning and open market access seem difficult bedfellows, but in an economy as huge as China's the role of the state is bound to remain of central economic significance. The critical issue for China remains development at all levels and the advantages of central planning Joan Robinson identified - they principally focus on the ability of the state to aggregate and mobilize economic surpluses - are likely to be long lasting. The real question is planning of what? Planning of industrial policy is likely to bring China into collision with the 'national treatment' clauses of the WTO, although the underlying issue here shades into global bargaining and ideology in the sense that the USA, Europe and Japan all happily pursue national industrial policies under the guise of various kinds of support for their private sectors. On the other hand, planning of standards and regulations governing interconnection guidelines, interoperability requirements, cost-based facilities sharing, quality of service benchmarks will be widely acclaimed.

an increasing business separation of content from delivery (called 'multiplexing' in a digital environment) and a regulatory (licensing) regime that reflects that separation.

¹⁴ 'It is tempting to see in the creation of the new Ministry of Information Industries (MII) a move towards convergence in policy and regulation of China's emerging electronic communications industries... A far more persuasive explanation of the creation and timing of the new ministry places it within the context of a more general overhaul of the state bureaucracy and radical pruning of the state budget.' (Ure and Liang, 2000)

¹⁵ Jiang Zemin and Li Langqing were respectively the original proponents of the Golden Card and Golden Gate projects. See Lovelock (1998)

The regulatory aspects of state planning are taken up in the Reference Paper that accompanies the WTO's Basic Agreement on Telecommunications.¹⁶ It details six areas of compliance: (a) competitive safeguards against predatory and discriminatory pricing by incumbent operators; (b) the availability of cost-based interconnection; (c) the burden of universal service requirements to be reasonable; (d) public availability of licensing criteria; (e) a regulator independent of the industry who offers 'national' treatment to new entrants; and (f) transparency in the assignment of scarce resources such as radio spectrum. As Zhang and Peng (2000) and Zhang (2001) make clear, none of these areas of compliance yet exist in China, but the regulations promulgated by the State Council and the MII to meet China's commitments are paving the way.

So the planning process can take numerous forms, from regulation and standards issues which govern the commercial activities of corporate enterprises to national economic and social objectives. According to the MII, presenting at the Pacific Telecommunications Conference in Hawaii in 2001, the prominent issues of the 10th 5-year plan are (a) setting and meeting the targets of universal service or access; (b) the deployment of broadband access; (c) developing China's capabilities in mobile equipment manufacturing and software development; (d) the application of ICTs to other sectors of the economy, including specifically e-Government, and the engineering construction, building construction and real estate sectors. The first of these issues, meeting universal service, is complicated by the tariff rebalancing process that removes direct cross-subsidization from the rich eastern provinces to the poorer central and western provinces. The MII further raised the hurdle in May 2001 by implementing an equal urban and rural tariff policy, which by reducing rural prices will drive up demand for access and usage.¹⁷ This leaves two principal approaches open to MII. The first is to introduce a universal service fund, a levy on all operators from which those who take on the universal service obligation are compensated.¹⁸ This is in the MII's plans. And in 'another possible post-WTO scenario, foreign carriers entering China could be encouraged to provide ICT services to rural, western areas before they are allowed a free hand to compete in the larger and richer eastern China market.' (Dahlman and Aubert, 2001, p.92) Currently there are no signs of this policy.¹⁹

¹⁶ 'But the Agreement's terms and conditions are rather vague, so China may interpret the requirements in its own way – to reflect the nationalistic and protectionist sentiments of Chinese regulators and companies.' (Dahlman and Aubert, 2001, p.90)

¹⁷ In the industry this is known as 'postalization' after the fact that postage stamps are normally a uniform tariff within a country.

¹⁸ This could be further subject to awarding the USO to the lowest bidder in an auction. The Telecommunications Regulations specifically permit the use of auctions to assign licences.

¹⁹ There are additional options, such as licensing local entrepreneurs to run limited service networks and points of access at the community level, licensing property companies to operate fixed wireline and wireless local area networks, promoting access through community centres and via NGOs, or adapting the experience of the Grameen Telecom in Bangladesh by giving micro-loans to rural women to buy and operate wireless local loop phone services.

The second prioritization listed, the deployment of broadband access, is in practice an issue that is likely to be determined more at the city and municipality level than the national level. Metropolitan cities have been in effective competition with each other to claim the most modern of communications infrastructures, and as the question of broadband access also raises questions of convergence (telephony, cable TV and Internet) the potential difficulties noted above are likely find a variety of solutions across the country.

The third point, developing the mobile equipment-manufacturing base, is pure industrial policy and may well become the subject of future trade dispute, and it is worth bearing in mind that by 2005 China is due to meet its commitment to the International Technology Agreement (ITA) and reduce import duties on technology goods to zero. The fourth point concerns the much wider considerations of China's national information infrastructure and information society goals: how to promote the take-up of IT across the economy and society? (We discuss IT in the next section of the paper below.)

During the period of the 9th 5-year plan, the important accomplishments in the realm of regulation for the telecommunications sector were (a) the separation of the regulator from the operator; (b) the separation of posts from telecoms and the ending of the cross-subsidy between them; (c) the incorporation of the latter alongside major restructuring, in particular the division of China Telecom into four separate operating companies, China Telecom, China Mobile, China Satellite and China Paging; (d) a major overhaul of the management and management structure of China Unicom, including China's first sallies into the foreign equity markets; and also (e) the drawing up for the first time of coordinated regulations prior to WTO membership, such as the Telecommunications Regulations and Radiowave Administrative Regulations.

The statistics showing how fast China's telecommunications industry has grown are quite well known, and Ding Lu (2000) gives a succinct account of the factors behind this growth. According to 10th 5-year plan projections, China will have by far the largest telecommunications network in the world, including up 280 million fixed line users and 290 million mobile users, raising the teledensity rates (lines per 100 population) from 11 and 7 to 21 respectively; 80 million computers in use, of which fifty per cent are forecast to be online, 200 million Internet users or 'Netizens', 150 million cable TV subscribers, and so forth. A socially important part of the targets is the raising of rural teledensity to around 11, compared with an urban average of around 40, and providing access to 95 per cent of administrative villages. In line with the goals of China's national information infrastructure (see below) broadband access should reach 2.5 per cent of the community by 2005, and the value of e-commerce, online medicine, education and entertainment is due to reach RMB 200 billion. The opening of China's fixed line telecommunications market is six years away, one year beyond the 10th 5-year plan, so national and local planning will remain a central characteristic driving investment for that period.

The 5-year planning process, together with the longer-term 10-year planning goals, is a mix of at least three elements. One, is an indicative framework within which ministries must devise their goals. A second is a meshing together of the planning process within

each ministry into a coherent 'story' of the progress achieved so far and to be aimed for. The third is a resource planning exercise, the primary duty of the State Development and Planning Commission. Matching the supply of resources to competing demands, and estimating likely resource growth to fuel future development is a process of fundamental importance to the achievement of economic and social progress, and therefore also to the political legitimacy of the Party's rule.

The role of planning in the development of telecommunications is instructive. Macro planning techniques have largely centred around econometric and engineering studies, at the highest levels of analysis drawing upon insights derived from China's input-output tables.²⁰ Unfortunately most of the tables relating directly to the telecommunications sector are not widely available, or available in English, because like other sector studies they are mostly undertaken within the universities and research institutes of the ministry concerned.²¹ To make matters more difficult, as Polenske and Xikang (1991) explain, the data – more so for 'value' than physical output - for many of these tables is often the result of estimates by the various statistical agencies involved that are hard to confirm.

For macro-planners input-output analysis has been used to construct alternative scenarios of development using various shadow prices to clear markets or bring about proportionality within and between the 'productive' and 'consumptive' sectors in the gross material product (GMP) framework that was acquired from the Soviet planning tradition.²² So, for example, in their shift to a light industry scenario Li and Li (1991) report on forecasts to 2000,²³ noting that the 'deviation of shadow prices for various sectors and their dynamic changes reflect changes in their demands. For example, the shadow prices of railways and communications have risen, especially during the Seventh and Eighth Five-year Plan periods, and it will only be by the year 2000 that some reduction will be seen.' But because telecommunication construction periods are shorter than those of railways, they forecast 'the deficiencies in communications and transport in the 1990s might be solved.' (p.67). This exercise in optimization programming becomes economic and social engineering when left in the hands of state commissars, that is when basic material inputs are directed from above, but it becomes something less dramatic and more pragmatic when the 'socialist market economy' gives enterprise management scope to source inputs and plan outputs according to commercial criteria. To identify and preempt economic bottlenecks, to establish national priorities in industrial investment or

²⁰ A valuable introduction to the history of input-output computation in China is Polenske and Xikang (1991) who include several examples of input-output work.

²¹ In the tradition of post-1949 China each ministry has its own universities and research institutions, vertically organized and divided by 'Chinese walls'. In addition there are research centres and institutes directly under the State Council, important national research organizations such as the Chinese Academy of Science (CAS) and the Chinese Academy of Social Science (CASS) that also have provincial units, and universities of national importance such as Peking, People's and Qinghua in Beijing, Fudan and Jiatong in Shanghai, etc. (See CEAIE, 1989 and subsequent editions).

²² From the 1980s onwards the UN System of National Accounts (SNA) was also adopted and for most of the period input-output tables have used the GMP framework with a SNA translation.

²³ GNP per capita for 2000 was forecast to be 3.5 times greater than in 1980. In fact actual GNP per capita for 2000 deflated by the general retail price index turned out to be 4.5 times greater.

social consumption, are the day-to-day activities of any government, although the means through which those priorities are arrived at and the means through which they may be achieved are subjects of substantial debate in every society.

Using data derived from the annual reports of the MPT we can separate telecommunication revenues from postal service revenues. Between 1990 and 2000 telecommunication revenues increased at an astonishing compound average growth rate of 40 per cent, more or less in line with fixed line subscribers who increased at a CAGR of 36 per cent. Annual investment in the sector, which includes handsets as well as line equipment, buildings and construction, increased from RMB8.6 billion in 1990 to RMB205 billion in 2000, and is projected to remain at around RMB250 billion to 2005. As a percentage of GDP, total revenues from the telecommunication sector grew steadily from 0.55 per cent in 1990, to 1.43 per cent in 1995 to 3.43 per cent by 2000, and according to the MII the 'informatization industry' - that is, ICTs²⁴ in general - contributed as value-added just under 2 per cent of GDP by the end of the 8th plan, nearly 4 per cent by the end of the 9th plan, and is projected to add around 7-8 per cent by the end of the 10th. By 2010 a quadrupling is envisaged, doubling GNP as a result. Unfortunately the input-output tables in the *China Statistical Yearbook*, which separates intermediate output from inputs to final consumption, the data for telecommunications is lumped together with freight transport and postal services, making it impossible to read the linkages in any detail. From the work of Li and Li (1991) we learn that in 1980 telecommunications and posts constituted around 1.8 per cent of China's industrial structure as measured by the 'value' of GMP, and in their forecast to 2000 this is seen as rising to 2.3 per cent. This clearly turned out to be an under-estimate, but as Ure (1995) points out, parameters shifted dramatically when the targets of 2000 were suddenly brought forward to 1995 following Deng Xiaoping's visit to the South in 1992.²⁵

The alternative macro approach to estimating the contribution of telecommunications to the national economy is the use of neo-classical production functions. Using this approach, according to Prof. Di (1993), Assistant Director of the National Research Centre for Science and Technology Development in Beijing, RMB100 million investment in telecommunications in 1988 would increase national income by an estimated RMB1.38 million between the fourth and the tenth year. 'The implicit internal rate of return is 45.1%.' (p.8) This is a much lower estimate than the MPT's 1:6.78 multiplier effect estimated using an input-output in the late 1980s and cited in Ding Lu (2000, p.393).

²⁴ The 10th 5-year plan states that the input-output ratio of the telecommunications manufacturing sector is forecast to rise from 1:1.5 in 2000 to 1:3.3 by 2005, suggesting a marked increase in productivity, but still lagging the IT manufacturing sector's ratio projected to reach 1:4 over the same period.

²⁵ 'China's telecoms remains essentially a planned or supply-driven industry, despite enormous pent-up demand from both business and residential subscribers.' (Ure, 1995, p.4) Drama such as Deng's politically motivated visit to the South is just one aspect of an unpredictable environment that renders an oxymoron of 'economic planning' by public or private sectors unless it is interpreted as a 'science' of strategic adjustments. The 'art' comes in the implementation.

Underlying the economic analysis of telecommunication's contribution to the national economy are assumptions about price and income elasticity of demand. Comparative international evidence is mixed (see Taylor, 1994, and InfoDev, 2000, table B-1) but it seems true as well as predictable that price elasticity rises with the distance of the call. However, and rather contrary to Taylor's assertions, there is no compelling evidence to suggest that price elasticity is equal to, or greater than, unity even for international calls.²⁶ The case may be different in China where tariffs start from a high base point, but the evidence strongly suggests that income, including the income effects of tariff reductions, is of greater significance. There is a tradition emanating from ITU sources that likes to place countries on a curve according to teledensity and per capita incomes, which for example leads Ding Lu (2000, p.375) to conclude that by '1987 China had a telecommunications infrastructure compatible with its income level. By 1994 the country had become more developed in telecommunications than in income level...China has become an over-achiever among low-income countries in developing telecommunications infrastructure.' While benchmarking is a useful policy tool it can also be misleading and the regression analysis upon which this thinking is based is nothing more than a glorified averaging process that explains nothing of the underlying dynamics. (See Lovelock and Ure, 2002, p.358).

In China's case the shift towards a 'socialist market economy' that introduces market disciplines, market incentives and the need to acquire and disseminate information, together with 'state enterprise reform' that introduces the beginnings of corporate governance and a demand for transparency of information and decision-making, will fuel business demand for telecommunications. Rising per capita incomes will fuel residential demand. These structural shifts associated with rising real income will lead the demand side of the equation, while policy and regulatory reform will drive the supply side even before the direct impact of WTO is ever felt. An important part of these reforms is price reforms, and although these are being introduced with an eye to their revenue effects, on long distance and rural traffic in particular, in practice they are being driven by the outbreak of fierce competition between China Telecom and China Unicom. On the one hand China Telecom faces genuine competition for the first time, and after WTO must anticipate competition from foreign entrants, and on the other hand both companies see enormous new opportunities in areas such as mobile, broadband and Internet.²⁷ Ure (1994) estimated that had tariff reform come in 1991, revenues could have risen up to 9 per cent.

The MII finally bit the bullet, after some earlier IDD tariff cuts, by announcing substantial reductions effective from early 2002. For example, the price of international

²⁶ Ure (1995) estimates price elasticity for IDD calls from Hong Kong as low as -0.3, a figure subsequently used in the government's calculation to buy-out Hongkong Telecom International's exclusive licence.

²⁷ Discounting on Internet telephony calls and calling cards has been particularly rampant in China. According to an industry source, for some time at least one major operator, not yet equipped to provide Internet telephony, was nevertheless offering 'Internet telephony' at prices to match its rivals over its circuit-switched network.

private leased circuits to Hong Kong, Macau and Taiwan fell by over 70 per cent, while long distance call charges fell from one yuan to 60 fen per minute, and all surcharges were abolished. Rebalancing of local tariffs had started in the late 1990s as call charges rose from 12 fen to 18 fen per 3 minutes, although the monthly residential rentals of 12 yuan usually also included free calling time. In 2002 local calls will be charged at 10 fen per minute, but as the MII argues that 75 per cent of local calls are below 3 minutes the effects will not be drastic. This tariff rebalancing is a sensible way to boost revenue from a growing demand for calling - led not by price reductions, except perhaps in the rural areas, but by a growing structural demand for communications and fuelled by rising real incomes. It is also an essential step towards adjusting prices towards costs before markets do it on their own. In that sense, central planning is adjusting strategically to coming changes in the operating environment, and while tariff reductions could have been forecast, WTO or not, their timing and circumstance does suggest more push than jump.

The role of planning, while still central to the administration of the economy, in the telecommunications sector is clearly becoming more indicative, even reactive, than previously. Many of China's bureaucrats in the 1950s were trained in planning techniques in the universities of the Soviet Union and Eastern Europe, the telecommunications minister Wu Jichuan among them. But one of the major lessons from Soviet economic history is the falsification of data from below,²⁸ sometimes the result of outright corruption, but just as frequently the result of a skewed incentive system that encourages managers to hoard scarce raw materials and intermediate goods and to understate their levels of output. The surpluses squirreled away provided a cushion for times when raw materials became too scarce and/or too costly, and when plan targets are driven higher they help managers fulfil quotas and receive whatever bonuses may be forthcoming. Alternatively, the surpluses can be sold on the black market. In principle these and similar problems need not be related to the form of ownership of the enterprise,²⁹ but more to the form of managerial control, transparency and the systems of incentives and sanctions. The challenge for all 'planners', whether they be in the public or private sectors, is to devise systems that match incentives to the benefit of the stakeholders, whoever these are defined to be.³⁰

Hidden transfer pricing is another problem for planners. Managers can shift losses or surpluses around between enterprises by over-pricing or under-pricing. This became a

²⁸ For example, a report in the *Financial Times* of London, 28 February 2002 (p.6) reads 'An internal investigation by the Chinese statistics authority has uncovered endemic fabrication of official statistics, hardening doubts over the credibility of national growth figures and applying pressure on economists to reappraise the way they judge China's economic performance.'

²⁹ As Enron, the largest bankruptcy in corporate history to date, and many similar scandals of corporate governance serve to remind us.

³⁰ Incentives need not be confined to narrow economic considerations, even if economic reward is most closely associated with market economies. The same can be said for 'a sense of ownership', and various schools of economic thought have these insights, especially the Institutionalist school with its evolutionary underpinnings, and the New Institutionalist school with its neo-classical underpinnings, but equally relevant are the 'animal spirits' of Keynes and Marx's concept of alienation.

particularly widespread practice once Chinese state-owned enterprises opened trading offices outside the mainland and found themselves able to accumulate surpluses in foreign currency not easily available on the mainland. The increased emphasis on the use of ICTs during the 8th and 9th 5-year plans, and the adoption of the Golden Projects can be seen in this light also; to monitor transactions and combat corruption, to use resources more efficiently and above all to improve the reliability of data for purposes of state planning. Of course, a reliance on technology to solve problems of human activity and motivation is naïve unless accompanied by a process of transparency that allows for a process of accountability. Market economies no more guarantee that than planned economies and it comes down to a more fundamental issue of an open society. In this regard, an optimistic view of WTO membership would be that it propels China in this direction.

The IT part of ICTs: The Background³¹

Deng Xiaoping's Open Door policy after 1978 raised the same set of dilemmas for China that premier Nikita Khrushchev's policy of de-Stalinization raised in the Soviet Union in the 1950s. 'Peaceful co-existence' meant cautious but progressive engagement with the world economy, but how was China to catch-up, especially after the self-destruction of the Cultural Revolution? Science and technology were given high priority in the drive to achieve the 'four modernizations' during the 1980s, but Party and State thinking found it difficult at first to entirely relinquish thoughts of autarky, or self-sufficiency.³² Apart from any ideological issues there always remain perfectly legitimate cost-benefit considerations in these debates, which are tractable, and definitions of what constitutes real development, which very often aren't.

The 10-year plan 'Outline National Plan for the Development of Science and Technology, 1978-1985 (Draft)' unveiled in 1978 by Fang Yi, the State Science and Technology Council minister and vice-president of the Chinese Academy of Science set targets, mostly unrealistic, to catch up with the West in several areas. These included basic and applied scientific research and technology development, including computers and lasers. More realistically, and more successfully, the policy shifted to technology transfer, especially after the relaxation in 1984 of United States and COCOM restrictions on technology exports to China. The new premier Zhao Ziyang modified the 10-year plan in 1982. He listed four dimensions of transfer: (1) from research to production, (2) from coastal to interior regions, (3) from defense to civilian sectors, (4) from overseas to domestic users. ('Speech at the National Science Awards Conference' *People's Daily*, 27 October, pp.1-3) A supra-ministerial body was formed in January 1983 reporting directly to the State Council, the Science & Technology Leading Group headed by Zhao.

For a while the Leading Group effectively replaced the SSTC and the CAS as the arbiters of science and technology policy in China, rather as the Commission of Information Industries has replaced the MII as the arbiter of policy on telecommunications and

³¹ This section of the paper draws heavily upon Lovelock (1998) and Ure and Liang (2000).

³² For a discussion of the different perspectives, see Xiaobai Shen (1999), chpt.2

convergence of ICTs. But continued lobbying for resources by the SSTC and CAS was rewarded in 1986 when Deng gave the SSTC responsibility for the '863 High-Tech Programme' designed to identify and fund areas of catch-up. The projects concerned were those expected to bear commercial fruit within five-to-ten years, such as computer systems, microelectronics, database and search engine technologies. By the early 1990s an emphasis was being placed upon communications technologies, including broadband-ISDN, optical-fibre technologies, personal communications network technologies and multi-media terminals and systems technologies.

An associated initiative was the 'Spark Programme' to promote high technology applications and their spread to the rural areas. By 1996 nearly 130 'spark technology zones' existed and 217 regional economic 'pillar' industries had been promoted. To consolidate these initiatives, in 1988 the SSTC announced the Torch Plan which was designed to promote the commercialization of research and development by forming 'clusters' of high-technology industries at the national and provincial levels.

By 1996, 110 high-tech industrial zones had been established in China under the Torch Plan involving some 15,000 new enterprises, according to Wang Ruiming, director of the SSTC Torch programme, who also announced the plan to 'buckle' these zones into seven 'belts': Suzhou-Wuxi-Changzhu in Jiangsu province, Pearl River delta zones in Guangdong province, the Shangdong Peninsula, the Liaodong Peninsula, along the Beijing-Tianjin-Tanggu expressway, southeast Fujian province, and Shaanxi-Shanxi provinces (*China Daily*, 11 April 1997). Besides electronics and information, the industries covered include computer-controlled machinery, new materials, biotechnology, new energy sources, and environmental protection. (Ure and Liang, 2000)

Within science and technology policy early special regard was devoted to the electronics industry in general, and to the computer and semi-conductor sectors in particular. A new Leading Group for the Revitalization of the Electronics Industry (originally named Computer and LSI Industry) was created in 1982 which by 1984 was being chaired by the then vice-premier Li Peng, and a year later telecommunications equipment manufacturing was added to its responsibilities. The Leading Group's 1985 'Strategy for the Development of China's Electronics and Information Industries' set the guiding themes for the development of the electronics industries for the next decade, including the 'close co-ordination and integration in the development of the electronics, computer and telecommunications industries.' (Simon, 1996). Henceforth, ICT convergence was officially part of the R&D agenda.

This was very much part of China's industrial policy programme, and although the rapid growth of telecommunication services was identified early on as an economic bottleneck to be removed,³³ not until the mid-1990s, when premier Zhu Rongji in the 9th 5-Year Plan officially shifted the central engine of economic growth from capital to consumer goods,

³³ 'It was the economic reform at the end of the 1970s that made apparent the serious constraints of the telecommunications infrastructure on economic expansion in China.' Xiaobai Shen (1999) p.16.

was ICT convergence considered in terms of becoming a service and information economy issue.³⁴ The golden projects promoted by the MEI may be seen as an early departure from this industrial focus, but in reality they were seen principally in terms of industrial modernization and state planning and not initially in terms of services to consumers. In China's National Information Infrastructure (CNII) being planned out at that time the consumer focus is really at its Level 4, the applications and content layer. Levels 1-3 plan for the integration of the public and private network structures and the value-added services layer (see Ure and Liang (2000) for details) with the emphasis on structures, technologies and investment.

Under the planning of the National Committee for the Informatization of the Economy, stage one of the CNII's development up to 2000 was focused at the service level on the development of public information through online databases, including the development of regional systems to achieve balanced national growth, on the integration and standardization of data traffic platforms and systems, on a broadening of access to the CNII, which has come about principally through the explosion of interest in the Internet, but also through the rapid growth of fixed and mobile telephone access, and on a move towards digital broadcasting where China is developing its own standards.³⁵

Stage two, up to 2010, includes a focus on applications, spreading the use of business and personal computing, doubling the output of the ICT sector, extending industry's capacity to innovate using ICTs and the building of broadband access and backbone networks. There is not space in this paper to delve into the details of implementation, nor is there very well grounded or comprehensive research yet available to do so, so reference will be confined to one very recent report, published by the newly-founded Center for the Future of China in Beijing and supported by the US-based Institute for the Future (IFTF).

The report summarizes the adoption of various management IT systems along the value chain, comparing common practice and implementation between the 'West' and China. The following table usefully summarizes the findings that are based on interviews and case studies in China during 2001.

³⁴ Placing importance on consumer interests is a rather recent phenomenon, receiving a boost during 1999 when public criticism of China Telecom's monopolistic prices gained momentum. According to one report from the MII, in 2001 quality of service complaints for the first time overtook complaints about tariffs. During 2001 the MII introduced several pro-consumer measures. These included regulations extending the payment period of telephone bills from 20 days to one month, requiring operators to offer itemized billing and to withdraw charges for diverting calls other networks, and in August the 'three guarantees' were introduced for faulty mobile handsets of 'repair, replace or refund'. Fixed line installation or 'implementation' fees were abolished in July, and the MII has intervened little to deter competition from reducing tariffs across the board despite its concern for revenues. But calling party pays (CPP) for mobile networks was postponed, subject to termination fee arrangements, but also in light of the 7% fall in China Mobile stock when it was first proposed in May 2001.

³⁵ Digital broadcasting may well prove to be an irrelevance for urban areas where cable or digital subscriber line (DSL) access becomes available. Analogue over-the-air broadcasting chews up huge amounts of valuable radio spectrum in the 500-800 MHz bandwidth that could be used for communications devices.

Comparison of IT Adoption and Applications Between the West and China

Term	Western Usage	Chinese Usage
Office Automation (OA)	“Webified” productivity suite	Internal e-mail
Management Information Systems (MIS)	All applications covering company’s vital data, and its centrally-coordinated computer systems	Basic finance plus procurement, sales, and inventory, but little or no information integration – sometimes known as <i>jinxiaocun</i> (‘supply’, ‘sales’, ‘inventory’)
Materials Requirements Planning (MRP)	Calculation of raw material requirements from planned production and current inventory	Does not differ from basic MIS and <i>jinxiaocun</i> (see above)
Computer Integrated Manufacturing Systems (CIMS)	Integrating Computer Aided Design (CAD) robotic machine tools integrated with resource procurement and scheduling	CAD/CAM but no transactional supply-chain procedures – 863 Plan promoted CIMS in machine tools and automobile factories
Manufacturing Resource Planning (MRPII)	Improves MRP software to avoid overload/underload situations	Purchasing and quality control, like Western MRP
Enterprise Resource Planning (ERP)	Integration of financial and standardization of manufacturing processes and HR information	Great deal of software customization, little changes in business procedures
Customer Resource Management (CRM)	Tracks customer behaviour to improve sales targetting and customer relationships	Incomplete customer information and little sharing across departments; call centres
Supply Chain Management (SCM)	Manage just-in-time inventory replenishment through the Web	Mostly done through fax and e-mail
Ability to Promise (ATP)	Automated; quick response via the Web to customer inquiry regarding manufacturer’s ability to fulfill an order placement	Fast improving driven by online ordering explosion; for most, still labor-intensive, person-to-person process

Source: Adapted from *Chinese High-Tech Manufacturers*, Center for the Future of China, December 2001.

The story behind this table is one of China’s manufacturing sector gradually adopting and adapting ICTs, but finding the transition frustrated by traditional ‘Chinese walls’ between departments that should be integrating their systems. A lack of trained professional staff and of modern business methods, a reliance upon manual methods constantly prone to human error and inaccuracy, and a slow coming to terms with a customer-focused market approach to enterprise. There is the familiar chicken-and-egg situation, where it takes the development of a market economy to energize enterprises to become enterprising, yet it takes enterprise initiative, specifically an innovative approach along the value chain, from product and service design, procurement, production and scheduling, marketing and sales and delivery, to customer relations and pricing, to build the market. ICTs are obviously a vital element in the whole process, but the rate of diffusion is understandably mixed. But constraints, such as a lack of modern management methods, a lack of trained personnel, a lack of systems integration, a lack of supply-chain management, a lack of suitable Chinese software, represent enormous business opportunities to Chinese and overseas

companies specializing in these areas. Local companies like Legend who make computers and who are branching out into systems installation and systems integration are already seizing their chances.

If there is one outstanding constraint that overarches it would seem to be the commercial reluctance in China to place monetary value on ideas, on knowledge, on software in its many forms. It is understandable that placing value on intangibles, or services, is conceptually difficult to grasp in a society that has not previously worked in that mode, and until China develops substantially more local products of its own – and development as opposed to basic research is perhaps the weakest link in China – the temptation will always be to pirate products. For this reason the thorny problem of intellectual property rights is looming in China, and WTO membership is bound to exacerbate the potential for dispute.

These are some of the realities. At the level of the 10th 5-year plan, by 2005 China aims to have 500 state-owned enterprises using IT systems and 10 per cent of large and medium-sized enterprises (LMEs)³⁶ using ICTs for production and management functions and 50 per cent of all enterprises using some kind of computerized systems for the financial accounting. And given the importance of the state sector in China, the driver of e-government is already significant (Lovelock and Ure, 2002). The 10th 5-year plan also envisages 50 per cent of government offices at county level and above as using computers.

Conclusion

Planning, or special treatment and encouragement, has driven the ICT sector since the 1980s, although the various sectors comprising the industries concerned have been the site of many turf battles. As a consequence, and because of the national priority assigned to these sectors, responsibility for policy making has frequently shifted from ministries and commissions to leading groups within the State Council, chaired by top leaders. Leading groups by their nature tend to be decisive and short-lived (see Lovelock, 1998). The norm is slow grinding consensus building and compromise, but when issues manage to surface to the top of the national agenda leading groups aim to shift the parameters. That is the aim of the Commission on the Information Industries, and of its chair, premier Zhu. It is the counterpart of China's entry into the WTO and to premier Zhu's programme of domestic economic reform, principally of state enterprises, of the taxation system and of the system of social welfare, and the introduction of the so-called 'socialist market economy'.

In this context, planning can be represented as something of a contradiction insofar as it poses industrial policy against WTO-type free market entry and market mechanisms. In practice this dichotomy is some years away, at least within the telecommunications sector. The reorganization of China's telecommunications industry anticipates WTO membership and foreign direct investment,³⁷ but the agenda for significant market

³⁶ An interesting contrast to the oft emphasized focus on SMEs in other economies.

³⁷ FDI in so-called "basic" fixed line and mobile services is restricted to 49 per cent equity after six years from China's WTO accession. Fifty per cent equity after three years applies to value-

opening is between three and six years, and the terms of China's agreement are sufficiently vague in detail, and the regulations preparing for their implementation sufficiently general to allow a liberal range of interpretation in practice. It could not be otherwise. China's trading partners are banking in part on enlightened self-interest, on the benefits FDI will bring in terms of resources, technology transfer and management methods, and in part on local self-interest among Chinese new entrants – everyone but China Telecom - who stand to benefit from foreign partnerships as 'hired guns' in the marketplace. In this context the proposed merger of China Telecom (north) and China Netcom reduces the number of local self-interests.

The MII has been dragged screaming and kicking to the opening of the market, and may not survive the quantum shift towards liberalization. But regulation remains a key to successful new entry. For example, the MII's regulations on interconnection remain totally inadequate, they do not mandate unbundling of network elements which means that the interconnecting party may be forced to pay for more than they really need or request, but so do Japan's interconnection arrangements long after the market was opened. The issue is ultimately one of national political persuasion. There seems little doubt that foreign entry into the services sector on any substantial scale will be delayed, but this may not be such a bad thing for investors insofar as the market may be much more receptive to broadband content and applications than currently. A slow implementation of WTO market entry may yet save many foreign investors from themselves. In any case, it seems that China's direction is determined for the foreseeable future; on the other hand no 5-year plan can really predict what that future will be.

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added services. Foreign investors must receive approvals from the Telecommunications Regulator for an operating licence, from the State Administration of Industry and Commerce (SAIC) for a business licence, and from MOFTEC to establish a 'Foreign Invested Enterprise' with a Chinese partner and the principal foreign investor must own at least 30 per cent of the equity of the foreign side of the JV. Similar rules apply to the Chinese side.

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