

Markus WAUSCHKUH

Telecommunications and Economic Development in China

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Telecommunications and Economic Development in China

by Markus Wauschkuhn, University of Bremen*

China is one of the largest and fastest-growing telecommunications markets in the world. In the past decade, the average annual growth rate of the telecommunications sector exceeded several times the growth of China's gross domestic product (GDP). In recent years, China has taken a series of measures to reform the telecommunications sector with the aim to introduce growth, innovation and competition in the market.

Two main global trends have to be underlined if the telecommunications sector is analysed. *Firstly*, the telecommunications industry is one of the world's fastest growing industries, no matter which indicator is regarded. The sector has a dual function, it is both, an important infrastructure for the overall economy and it is a very vital business on its own. *Secondly*, technological developments, in particular the process of digitalisation, led to the convergence of the different types of media. Voice and sound, pictures, movies, data – different types of information can in a digitalised form flow in various ways to reach the user. Computer networks and, particularly the internet, play an increasing role in communications. Due to this convergence, the sector is often referred to as "information industry" or as "information and communications technology".

Various studies underline that technology and innovation in this sector will be the key drivers of increased growth performance in the future (e.g. OECD 2000). In particular developing countries are addressed as the main beneficiaries of the telecommunications industry (e.g. Forge 1995, Smith 1994, Saunders, et al. 1994, Mody, et al. 1995). Developing countries – without an older telecommunications infrastructure, which often led to path-dependent investments in old technology – could "leap-

*) A previous version of this paper was prepared for the conference "Schumpeter and Asian Dynamics" in September 2000 at the Aichi University, Toyohashi, Japan.

frog" to a higher level of technology and take this as a chance for a catching-up process.

China is an outstanding example for such a development. With huge infrastructure investments in the first period, gradual reforms in the second period, and a new dynamic in the context of the WTO negotiations, China raised some hopes – which aren't dashed up to now.

During Asia's financial crisis, China increased investment and the pace of reform, which helped the country to come through the threat of a slowing growth of the economy. A growth of GDP 7-8% is expected for this year. The whole region benefited from China's economic stabilisation (World Bank 1998, World Bank 2000a).

1 Economic Reform Policy and Telecommunications

For most of the time of the People's Republic of China, since its founding in 1949 up to its opening policy in the 1980s, the Ministry of Posts and Telecommunications (MPT) was the main operator of telecommunication services and – in a dual function – its regulator. At the time of the Republic's founding, the country had a number of 300 000 telephones in total, which means one telephone for nearly every 2000 people.

The development of the telecommunications sector wasn't the first priority during the socialist period unlike the development of an industrial structure. The number of telephones grew very slowly and stagnated relative to the population's growth. The percentage growth in telecommunications lagged behind that of gross domestic product. And a strong bias has to be recognised: almost every development in telecommunications happened in urban areas while most rural parts of the People's Republic keep unconnected for the first three decades of its existence.

In the early 1980s China's government changed its mind about the role of telecommunications for economic development. With the policy of

economic opening under Deng Xiaoping, the government's policy was designed to attract foreign investment and technology. The improvement of the telecommunications infrastructure became a first priority in the reform process. If telecommunications products were regarded as less important consumer goods in the pre-reform era, the attention shifted now to telecommunications as an important part of the economic infrastructure and a major source of productivity gains. It was believed that a 1% rise in the number of telephones could contribute to as much as a 3% increase in gross domestic product. The government began to increase investment in telecommunications construction. However, even if the investment in telecommunications infrastructure multiplied several times during this period, its relative share of all investment remained low at about 1% for the first years due to the very low level the investment had the years before (He 1997).

1.1 Economic Reform Policy

The efforts to improve the telecommunications sector as a key strategic factor were reflected by various measures in the government's five-year-plans. Apart from claiming priority for the telecommunications industry, the economic plan suggested to a) focus the activity on major cities and the coastal areas, b) allow the telecommunications industry to receive state loans with extended payment time and to borrow foreign currency, and c) give the industry a preferential taxation (He 1997: 75pp).

As the key measure of the first steps of reform and as the most remarkable engine of growth the policy of the "Three Reserved 90%" has to be indicated. Under this policy, the telecommunications industry is exempted from repaying 90% of central government loans, could keep 90% of its profits – which means a taxation of 10% compared to 55% of non-preferred industries, and could keep 90% of its foreign currency earnings from international telephony traffic (He 1997: 76p). The policy, which was introduced in the mid-1980s, was repealed in 1995 because it was regarded not longer necessary.

This policy of giving a preferential treatment to some specific areas, especially to the special economic zones and the open coastal cities, strengthened the bias against the rural areas, which initially stemmed from the pre-reform period. By 1991, those areas concentrated 37% of the country's long-distance lines. The growth of teledensity was with 5% in the coastal cities and with 18% in the special economic zones far higher than the national average with 1,3% (He 1997: 79).

1.2 Institutional Reforms

The telecommunications sector had undergo some steps of institutional and structural reform, which helped the industry developing. The Ministry of Posts and Telecommunications, both, the regulator and major supplier of telecommunications services, found itself in form of socialist competition in the early 1990. Some Post and Telecommunications Administrations (PTAs) on the regional level and Post and Telecommunications Bureaus (PTBs) on the local level, which are formally dependent from the Ministry, gained some autonomy in their decisions. The level of autonomy varied and reflected the level of administrative autonomy. Some PTAs like Shanghai Telecom act as de-facto independent enterprises (Mueller and Tan 1997). They are allowed to operate intra-city calls and to retain the profits for further investment and development. This form of re-investment led to a nearly self-financed expansion of telephone capacity in the major urban areas and was additionally fuelled with investments, which some local governments – especially the Special Economic Zones and Open Coastal Cities – made to intensify their telecommunications.

In China as a whole, residential telephone lines exceeded the number of business lines since 1995. This growth is all the more impressive because connection fees in China's major cities are calculated that the true costs are covered: urban subscribers have to finance their own installation and connection (Mueller and Tan 1997: 29). In the early 1990 the fees were above the monthly salary of the average Chinese. This led

to a new form of business: street phone services, which, however, lost its importance in the last years due to the declining fees.

For national calls, a new accounting system was introduced. The provincial offices were given control over equipment purchases, investment decisions, and network planning. They are allowed to co-operate with foreign investors in order to plan and construct their networks and to buy the necessary equipment from abroad.

However, the co-operation is limited to this point. Up to this year, foreign investors are not allowed to participate in the operation of networks. Opening of this sector was a major topic in last years WTO negotiations and China agreed to allow foreign engagement in this part of the economy. Until then, the operation of telecommunications networks is almost the last island without legal foreign investors in China's economy.

1.3 Competitors in the Socialist Market Economy

In 1993, the Ministry of Posts and Telecommunications was reorganised by the government. The regulator was separated from the operator who acts as China Telecom since then. The government introduced competition in the form of China's second carrier, China Unicom, which is allowed to offer both fixed-line and radio-based services. China Unicom (United Communications Corp., Liantong) is jointly owned by the Ministry of Electronics Industry, the Ministry of Railways, the Ministry of Electric Power, and 13 other giant state-owned enterprises (Yan and Pitt 1999).

In the course of time more competitors for fixed line telephone services arose. Most of them were originally founded to provide a network for data communications, however, with digitalisation and the convergence of the different types of media, these networks allow a telephone communication as well. Jitong is the oldest of these enterprises and was a substantial part in the so-called "Golden Projects" with constructing satellite, microwave and cable connections for huge data networks (Ure 1995b).

In a form of spontaneous privatisation several state owned enterprises, township and villages enterprises, and some ministries and local branches of the People's Liberation Army (PLA) started to make use of radio frequencies for the operation of mobile phone, pager, and other radio based systems. Although these networks were supposed to be non-public, the distinction to private networks was not clear-cut due to agreements of interconnection and revenue-sharing (Ure 1995b: 14).

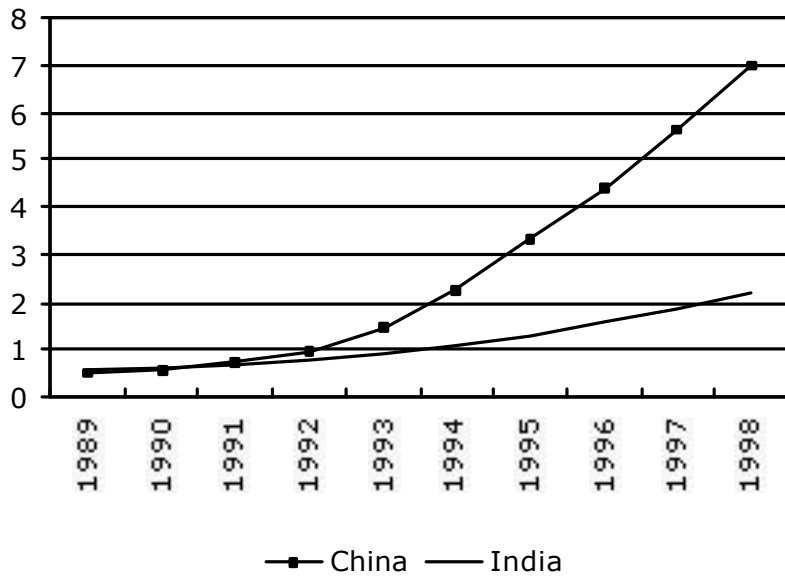
The operation of such "grey" services opened a backdoor for foreign investors, especially from Hong Kong and Taiwan. They provided capital and consultancy for the construction and operation of the network, which is contractually repaid by the revenues. Some local branches of China Telecom attract investment on the same way (Mueller and Tan 1997: 40).

1.4 Growth of the Telecommunications Sector

With giving telecommunications a higher priority over many other industries, China's government began to formulate specific plans for the telecommunications sector. In the 1980s, the Ministry of Posts and Telecommunications published a 15-year plan for telecommunication. The plan sounded very ambitious: the Ministry wanted a fixed-line teledensity (lines per 100 people) of 2.8 by the year 2000. However, the government achieved its goal well before the deadline. By 1995, there were already 40 million fixed-line subscribers and the teledensity rate had already reached 3.4%.

Up to 1996, China added about 14 million new main telephone lines per year, in a two years annual average. India, for comparison, had at that time the same figure of telephone lines – in total. This growth is much more impressive, if we take into account that both countries started at a similar level only 6 years ago. Both countries had a teledensity of 0.6 per 100 inhabitants in 1990, which India nearly quadrupled until 1998, however, China exceeded India's teledensity more three times in the same period.

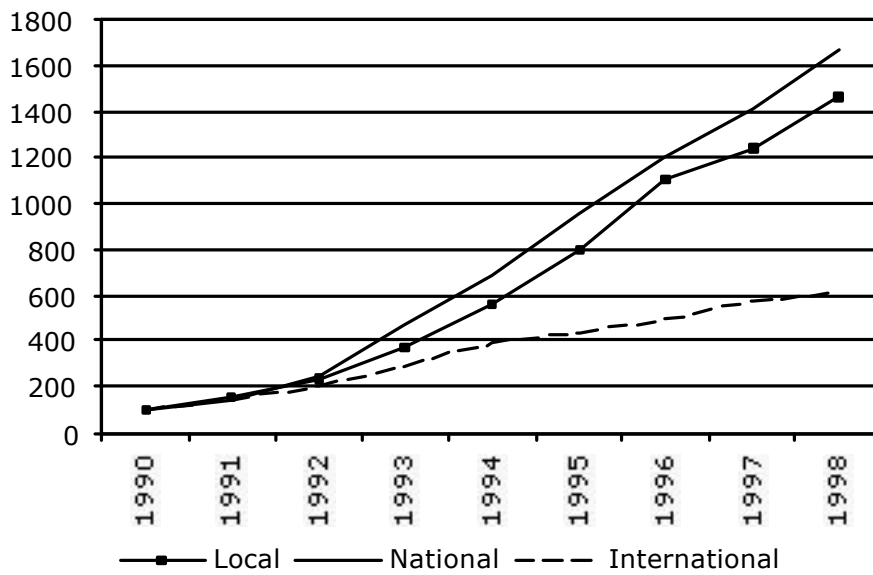
Fig. 1: Telephone Lines per 100 Inhabitants



Source: own calculations, data from *International Telecommunications Union 2000*

The number of calls increased in this period significantly as well. The growth was a little behind the growth of teledensity. The number of calls eightfold from 1990 to 1996 with little difference in relative growth. The number of international calls increased about five times in this period, partly due to the high fees (see Figure 4) for international communication. In absolute figures, the distinction for Chinese customers and businesses became more obvious: local calls had a share of 92% of all calls, while national (7%) and international calls (<1%) were less important.

Fig. 2: Number of Calls (Index 1990 = 100)



Source: own calculations, data from International Telecommunications Union 2000

2 Telecommunications after Asia's Financial Crisis

2.1 Increasing Attention for Telecommunications

Fearing a slowing growth in the context of Asia's financial crisis, China's Government laid its explicit emphasis on new investments in telecommunications to stabilise the growth path of the Chinese economy. The total investment in basic post and telecommunications construction increased about 17% in 1996. A share of more than 85% of this amount is directed towards the telecommunications infrastructure (Business China 1998a).

With its plan to increase spending on basic network equipment telecommunications to an amount of US\$ 16 billion annually for a five-

year period, the government focused its policy at the beginning of the crisis on improving the basic network infrastructure (Business China 1998b). The expanding network capacity led on the one hand to a growing market for the young industry of domestic suppliers of telecommunications equipment, on the other hand to rising productivity gains for other enterprises. In a long-term view, these infrastructure improvements are expected to help the infant indigenous high-tech industry growing.

At that time, however, the major share of the new investments flow in the network infrastructure of the former monopolist China Telecom. Mainly China Unicom had to suffer from this lack of official engagement, but the other "grey" operators were partly excluded as well and helped themselves with "informal" foreign investment as mentioned above.

China Unicom financed a large share of its expansion with the dubious Chinese-Chinese-Foreign (CCF) investment model: The foreign investor sets up a joint venture with a Chinese partner, which is more or less hidden in co-operation with the Chinese network operator. The revenues of the business flow proportionally through the joint venture to the foreign investor. Such operations are obviously illegal and investments in such a grey sphere are risky.

However, China's government tolerated this system for some years and prohibited in 1998 the founding of new joint ventures with this method, leaving the existing CCF joint ventures untouched (Yan and Pitt 1999).

The expansion of the infrastructure was mainly the result of the government's industrial policy to improve the telecommunications networks, it was not driven by industry competition: China Unicom, the only competitor of China Telecom had a market share of less than 5% at the end of the 1990s. The interest of foreign investors was limited by several restrictions, particularly the formal illegality of network operations.

2.2 Increasing the Speed of Reform

A new Role for the Regulator

With its entry as the major competitor to China Telecom in a fast growing market, China Unicom had ambitious plans. It had intended to reach a 10% market share of the local and long-distance service market by the year 2000. This was not only the view of China Unicom's shareholders – which are mainly rivalling ministries to the Ministry of Posts and Telecommunications, but also the view of the central government.

However, these expectations were based on a substantial wrong assumption: that the Ministry of Posts and Telecommunications would act as a neutral, independent regulator.

Instead of this, the regulator disadvantaged China Unicom in several ways. One of its biggest problems was interconnection with China Telecom's networks, which is necessary to provide an attractive service for its customers. China Telecom gave interconnection to China Unicom only at a very low level. Without the necessary interconnections, Unicom networks only provide telephone service in those areas with their own telephone system.

"While the MPT was supposed to be an independent regulator, many of its policies favoured China Telecom. The MPT opposed the formation of China Unicom from the beginning, arguing that China needed a strong monopoly provider to roll out the infrastructure the country needs quickly and efficiently" (ChinaConnect 1999).

In the consequence of Asia's financial crisis, however, China's government began to force back the monopolistic role of China Telecom. The aim was to introduce more competition, better service for lower fees and a growing demand of domestic telecommunications products to enhance productivity and consumption.

In a first step, which happened 1998, the old regulator was eliminated and integrated in a new Ministry, which should represent the

convergence of information, media and technology: the Ministry of Information Industry (MII).

End of the de-facto Monopoly

In a second step, in 1999, China's Government broke up the former monopolist China Telecom in four pieces, three of them from now on independent companies. The split followed the operating lines to have a quasi-privatised competitive environment. The fourth part, Guoxin Paging, the former paging branch of China Telecom, was merged with China Unicom. Guoxin Paging had three times the size of China Unicom. As a result, China Unicom was allowed to offer paging services. The three other parts of the split are China Telecom, operating the fixed lines, China Mobile Communications¹ and China Satellite Communications (People's Daily 2000b). With the restructuring of China Telecom began the sector's market-oriented reforms. However, the first year of the process resulted in negative growth in network infrastructural investment in 1999.

China Unicom, once the discriminated competitor of the former monopolist, receives now unlimited support of the government. The company, the country's second largest mobile communications provider, is used by government to break up the monopoly and to enhance competition in this sector. China's government announced to give such preferential policies as well to other new players in the market in order to strengthen their competitiveness for the beginning opening for international actors, which will be part of the WTO agreement (People's Daily 2000b).

In early 2000, China Unicom had about 5 million mobile phone users, a small number compared with 40 million of China Mobile. However, with the government's recent reforms, China Unicom has become the country's only full-range telecom service operator, including fixed line,

¹ The official establishment was in early 2000. China Telecom is officially named China Telecommunications (Group) Co. and China Mobile's name is China Mobile Telecommunications (Group) Co.

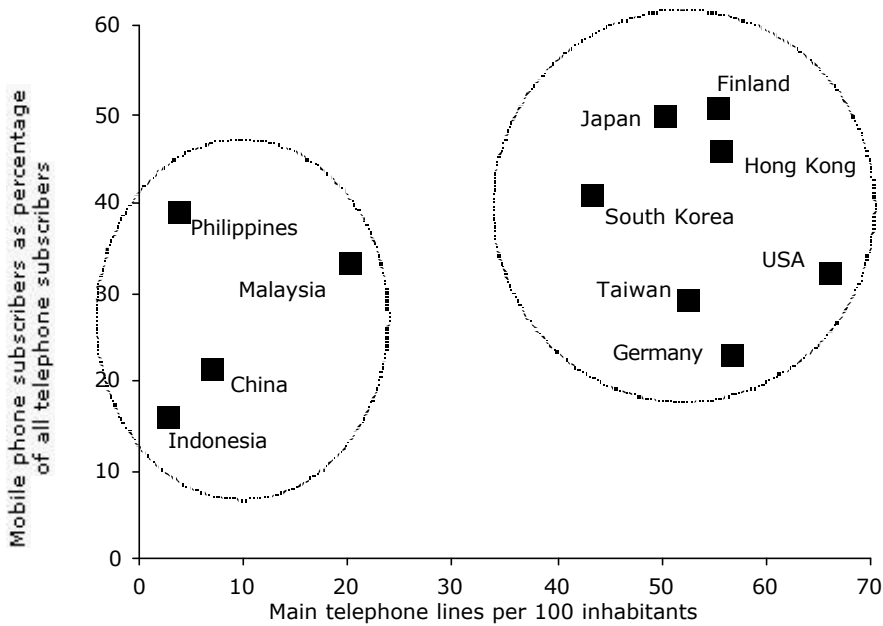
paging, GSM and CDMA mobile phone communications² and internet access service (People's Daily 2000b). Particularly the licence to operate a nationwide mobile phone network with the CDMA technology could be the key to become an equal competitor.

The regulator's preferential policy for China Unicom allows the company to offer communications services for a fee which is – depending on region and services – about 10 - 20% lower than the prices of China Telecom and China Mobile, its major competitors. China Unicom is not bound to provide universal service all over the country until it reached a higher market share. At the end of 1999, China Unicom was even in its core business – mobile communications – quite small compared to China Mobile with its 90% share (People's Daily 2000e).

2) CDMA (code division multiple access) and TDMA (time division multiple access) are two different types of cellular network technology allowing the fragmentation of the communication and, as a result, a multiplication of network capacity – with advantages for CDMA. TDMA allows to triple the network capacity compared to an analogue network, while with CDMA a capacity expansion of factor 10 is stated. The US adopted TDMA technology which allows the parallel use of their older analogue system AMPS (Advanced Mobile Phone System) within the same network. In contrast, the European Union's Global System for Mobile (GSM) standard, an own variation of TDMA, is not compatible to older mobile systems. The main advantage of the US technology has to be seen in the gradual transition from an analogue to a digital network, while GSM provides more flexibility with lower prices for the handsets. However, the attractiveness of GSM derives mainly from the widespread worldwide use of this technology. CDMA, as an alternative, covers a larger area per cell, which makes this digital standard especially attractive for countries and regions with low urbanisation (Schwartz, Rachael E. 1996. *Wireless Communications in Developing Countries: Cellular and Satellite Systems*. Boston, London: Artech House.). A number of 570 million mobile phone users is estimated for mid-of-2000, a share of 10% of world's population, with a growth of 100 million users for the first half of this year. A share of 60% or 330 million people use the GSM standard (mainly in Europe, Africa, Middle East and some parts of Asia), 67 million use CDMA (mainly Japan) and 48 million TDMA (North America) (Heise Online. 2000b. *Weltweit rund 570 Millionen Handy-Benutzer*. August, 20 2000. <http://www.heise.de>).

The third generation of mobile service, or as sometimes referred to as personal communications services (PCS) will make use of the convergence of fixed and mobile services and of voice and data communications. New standards like the Universal Mobile Telecommunication System (UMTS) will provide an integrated network for different services: cellular, wireless and paging with a variety of new features.

Fig. 3: *Mobile Telephones: Supplement or Substitute?*



Source: *Own Calculations, Data from International Telecommunications Union 2000.*

However, China Unicom's growth is very fast and the company relies on its technological competence. It follows a consequent strategy of developing a full-digital mobile network covering the cities firstly, and afterwards spreading to rural areas continuously. China Unicom is expected to reach a third of the mobile communications market. China Unicom offers as well such advanced technologies like IP calls to mobile phones or connecting mobile phones to the internet.

The use of mobile phones is in technological late-comer countries like China significant different from countries, in which the telecommunications industry has a longer history. Mobile phones are widely used not as supplement to fixed line phones, but as substitute. Fig. 3 shows how those groups of countries are clustered.

Further Deregulation and Liberalisation

In a third step, the new Ministry increased the level of competition with several measures. Interconnection, as a key factor of networking, was regulated and must be offered by China Telecom to China Unicom and other service operators in accordance with the regulations. The activities of ministries and governmental organisations like the mobile phone services of the People's Liberation Army (PLA) were stopped and integrated in the the system of existing "regular" service providers. PLA's "Telecom Great Wall", e.g., a CDMA cellular network, was joint with China Unicom. The convergence of digital services permits the market entry of enterprises offering data communication or satellite services.

Government officials stated that they will eventually licence more companies to operate mobile services in the near future. China Telecom and China Netcom are discussed as new candidates for providing mobile communications. The government is as well preparing licences for a new "third generation" mobile communications network, which allows a better integration of voice and data services. It is expected to announce the new operators within the next two years (People's Daily 2000b).

Even after the break up of the former monopolist, the newly founded splits are still state-owned and, more over, both China Telecom and China Mobile belong to the very large state-owned enterprises (SOE)³. However, the deregulation gets China Telecom to improve its profitability. To reduce its operating costs, the company announced to lay off 200 000 of its 530 000 workers within the next five years (People's Daily 2000g).

The new competitive framework urged China Telecom to a large number of measures to improve its efficiency and technological level in order to receive a better position in the market. It announced to speed up the construction of infrastructure and intensify the development of new technology, businesses and products (People's Daily 2000f). China

3) The registered capital of China Telecom is 220 billion yuan and of China Mobile is 51.8 billion yuan (People's Daily, 2000d. *China Sets Up Two Giant Groups in Telecom Sector*. Sci-Edu, April 21, 2000. <http://english.peopledaily.com.cn>).

Telecom also begins to sell its network capacity to other telecommunication service operators. The fees which are charged for directing through calls from other operators are prescribed by the regulator, the Ministry of Information Industry.

For the mobile telecommunications networks as well, the Ministry urged the major operators Unicom and Telecom to co-operate and to come on an agreement on interconnection between both networks to avoid duplicated construction and vicious competition.

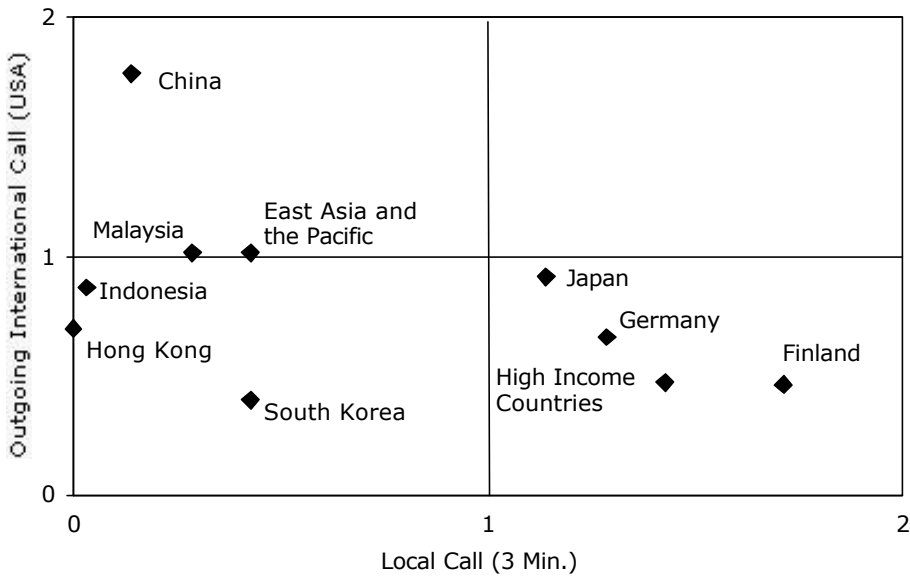
Adjustment of Charges and Fees

Customer charges are authorised by the Ministry of Information Industry as well. It is aimed to adjust the prices for telecommunication services to the different regional economic performance and the differences of urban and rural customer's interests. It is expected that the telephone charges will be lowered in average. Particularly the prices for international calls and the installation fee, which is currently around 1,500 yuan (US\$180) per new phone, will fall clearly (People's Daily 2000f).

Communication fees in China were in 1998 (see Figure 4) relative high. The prices for international were nearly prohibitive: a 3-minute call to the United States had cost the customer US\$ 6.7, which is nearly 75% higher as the average of the Asia-Pacific region. The price for local calls was in 1998 significant lower, however, Indonesia, for example, has lower charges for both types of services. Figure 4 shows the prices for 3-minute calls relative to world's average (world =1).

In its efforts to introduce a cost covering policy, or, as critics argue, to get the most profits from the present, quasi-monopolistic position in several regional markets, China Telecom tries to raise the local phone price from currently 0.18 yuan (US\$0.02) per three minutes to 1.0 yuan per minute (US\$0.12), which would be an increase of 66% from the current level (People's Daily 2000g).

Fig. 4: Cost of a 3 Minute Telephone Call 1998 (Index World = 1)

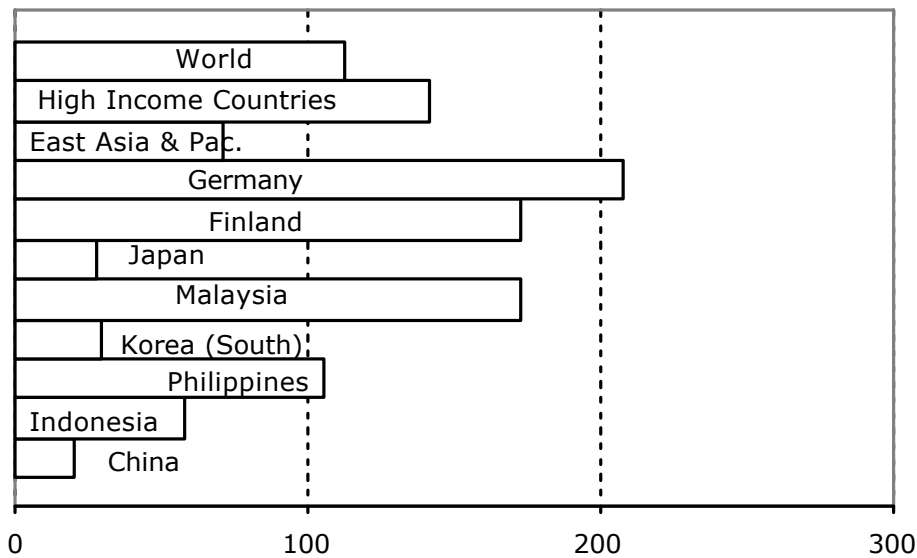


Source: own calculations, data from International Telecommunications Union 2000

Since 1998, China's mobile telecommunications fees and charges have been reduced twice. Further price cuts in this sector are promised, particularly the elimination of hidden costs like the fee for a change of the user's name. It is also announced to improve the quality and the service for the customer.

Even if the number of international call is continuously rising as it is shown in Fig. 2, there is still a high potential for improvements in this topic. The time a subscriber spent in average to make international calls is very short compared to the international level. Even if taken into account the fact that China is a large country with a large number of domestic users: the very high fees for international calls play a significant role probably.

Fig. 5: International Outgoing Calls 1998 (Minutes/Subscriber)



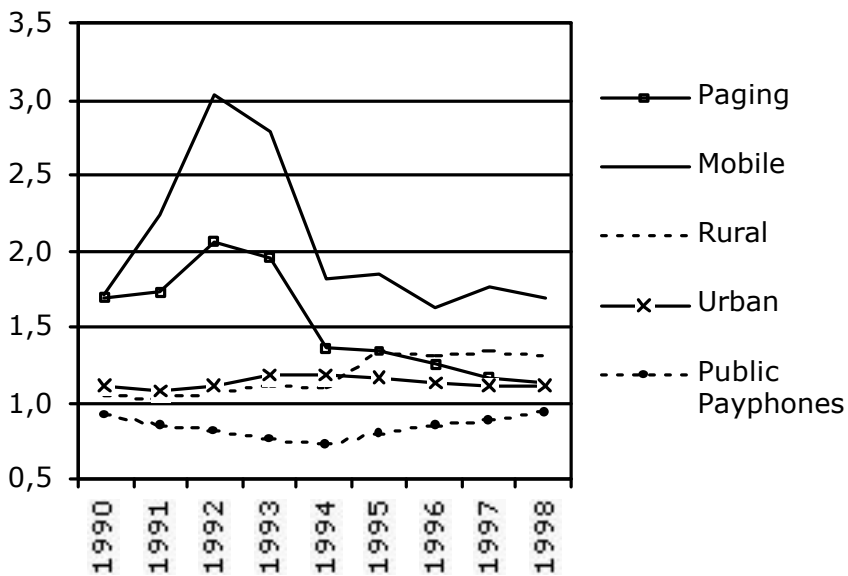
Source: Own Calculations, Data from International Telecommunications Union 2000.

Changing Framework

With its steps of deregulation and liberalisation, China's government managed it to overcome the decreasing dynamics in the telecommunications industry. The reforms are forcing the sector's development forward and this is a great push forward to the country's opening up, the progress of general economic reforms and modernisation. The restructuring of the telecommunications sector over the past few years has improved the competing and development capability of the industry as a whole. The key factors addressed are the communications infrastructure, the birth of an information-orientated economy and the improvement of the international competitiveness of Chinese enterprises.

In the development of China's telecommunications industry several trends can be identified. Figure 6 shows the growth of paging, mobile phone, rural and urban fixed lines and public payphones relative to the growth of the year's per-capita income. In 1992 the growth of mobile phone subscribers exceeded the growth of per-capita income three times. 1992 was the year with the highest relative growth for most services, but the growth in telecommunications services remained relative high for the whole period, even in the years of Asia's financial crisis. The role of pagers is continuously declining over the years, however, there is still an important and substantial number of new subscribers. It has to be stressed that the number of rural phone subscribers is growing, and since 1995 it is growing faster than the number of urban telephone subscribers.

Fig. 6: Relative Growth of Services by Year



Source: Own Calculations, Data from China Statistical Yearbook 2000 and International Telecommunications Union 2000. Note: Figures are calculated as growth in services relative to the growth of per-capita income $[(Service_t/PCI_t)/(Service_{t-1}/PCI_{t-1})]$.

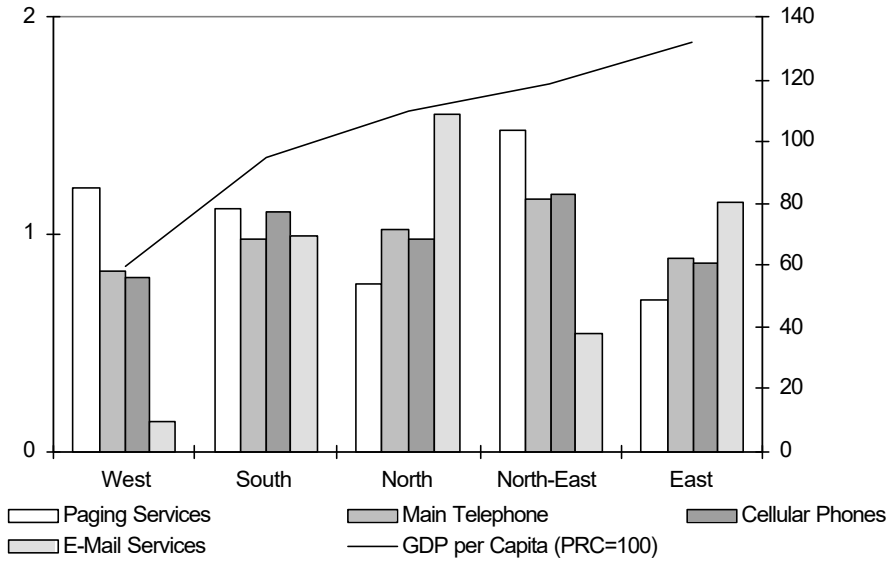
2.3 Regional Development

China's telecommunications age began with a strong bias against rural areas, which effects are still determining the present (Lee 1997b). In the last years, rural areas started to catch up the backlog. Nevertheless, some major differences remain.

In the mostly developed regions of China, the use of fixed line and relative more the use of mobile phones is very now widespread. In the 14 major urban areas of China, about 88% of the households had fixed line telephones by the end of 1999, and 35% had mobile phones; and about 4 % of the families have their own fax machines as compared to 0.2

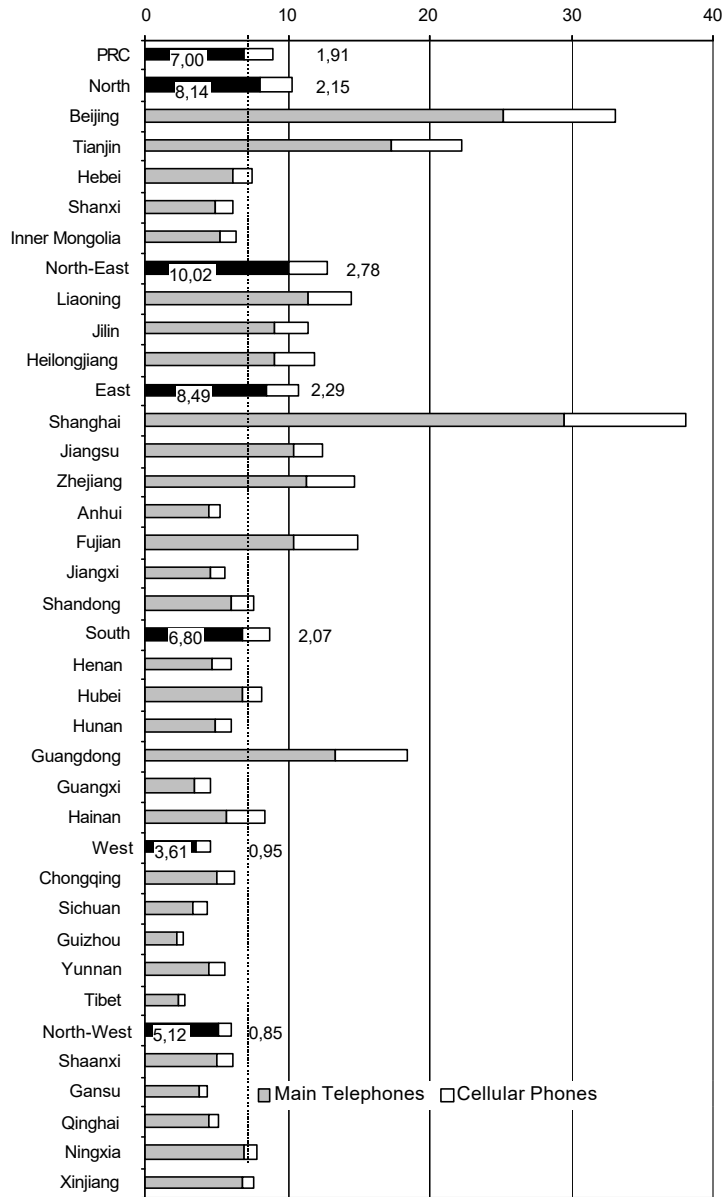
percent in 1997. Even the internet is becoming more and more popular in urban areas: About 6.5 percent of the families have internet access. (People's Daily 2000m)

Fig. 7: Relative Growth of Services (by Year)



Source: Own Calculations, Data from China Statistical Yearbook 2000 and International Telecommunications Union 2000. Note: Figures are calculated as region's share of service relative to region's share of GDP $[(ServiceRegion/ServicePRC)/(GDPRegion/GDPPRC)]$

Fig. 8: Regional Distribution of Telephone Subscribers 1998 (per 100 Inhabitants)



Source: China Statistical Yearbook 2000

The demand for telecommunications equipment – in particular on the "low-tech" side – seems to be satisfied in those urban areas. Installation of new fixed lines and the purchase of pagers decreased about 6% in 1999 (People's Daily 2000m).

Figure 7 shows the relative importance of services in the region. A figure of 1 indicates a number of service subscribers, which could be expected from the region's share of national GDP. As an additional information the relative per-capita income (national average = 1) for the regions is shown.

In the western region paging services are relative important, while in the North and in the East e-mail services are widespread. The western region has a relative lower share of services subscribers, while the lower figures for the South relative to the share of GDP are result in the high regional GDP. In the southern regions of China relative more cellular phones than main telephones are in use, while in other regions mobile and fixed phones have reached the same level of importance.

The differences in regional distribution of telecommunications become more obvious if we regard the teledensity of the provinces and municipalities. In the nationwide average, China counts 7 fixed line telephones and 1.9 mobile phones per 100 inhabitants. In the North, the North-East and in the East these figures are exceeded while the south has a teledensity which is about the average China.

Teledensity in the western and north-western region is significant lower, however, inner-regional distinctions play an important role as well. Such differences are essential for the more developed areas as well. In Shanghai and Beijing the use of telecommunications exceeded the regional average three to four times.

3 Recent Developments

3.1 Technological Innovations

The promising plans for a satellite communications network developed slowly in the last years. With the re-organisation of the former monopolist, however, a new operator with satellite communications as its core business arose: ChinaSat. It remains unclear if this company will offer telecommunications services to end customers.

Even if the development of telecommunications is impressive: the pace of development of the internet is still faster. In early 2000, the Ministry of Information Industry estimated the number of internet users in China of about 10 million. The number of new Internet users doubled compared to the number at the end of last year. Up to now, China has only 20 million computers, but this number is expected to rise sharply in the next years. China's urban areas are connected with fast state-of-the-art data networks. Officials believe that the trade volume of China's E-commerce will be about 100 million US\$ this year and expect this volume to rise to 1.2 billion US\$ within two years. The Ministry counted more than 1000 E-commerce websites early this year (People's Daily 2000m).

China tries to make benefits of its fast data network even for its telecommunications services. Several companies began not only to research on IP telephony (internet telephony), but to offer such services to their customers on a regular basis. China Mobile, for example, offers IP telephony over their GSM network. Without any special requirement to the user's technical skills, the user can make local and international calls for low charges: 0.30 yuan per minute (US\$ 0.04) for domestic long-distance phone call, and 4.80 yuan per minute (US\$0.58) for an international call.

3.2 WTO

After almost 14 years of efforts China is expected to join the World Trade Organisation (WTO) in the near future. In one of the last bilateral

negotiations, China agreed with the European Union to liberalise its telecommunications sector to a further extent as it was announced before.

Besides more market orientated reforms, joining the WTO means further change of rules for the major players in the sector. There is some doubt whether China's telecommunications industry is competitive enough when the country will open its doors for foreign investors. China's government is strengthening its efforts to improve the performance of the domestic actors. It is a twofold strategy: on the one hand to help the domestic industry to survive in international competition, on the other hand to change the industrial policy to make it consistent with international practice. China prepares or had prepared new regulations which meet international requirements concerning not only access to the telecommunications suppliers and services markets, but access to and doing business in the internet as well. The government acknowledged these topics as important aspects of reliability for foreign investors.

Requirement for further reforms arises from within the sector as well. To avoid that telecommunications operators only try to take the pick of the bunch, the government plans to commit the enterprises to offer universal services, i.e. to offer communication services in rural areas as well, which is much more costly for the operators. At present, only China Telecom and China Mobile offer universal service across the country (People's Daily 2000b).

China agreed to end regional restrictions for paging and value-added services within two years, mobile-cellular services within five years and domestic fixed line services in six years. The government announced to open the most important routes of domestic telecommunications services – between Beijing, Shanghai, and Guangzhou, representing about 75% of all domestic telephone traffic immediately after WTO accession (People's Daily 2000b).

Liberalisation of foreign investment in operating telecommunications services will follow a few years after WTO access. China will allow 49%

foreign investment in all services, and will allow 50% foreign ownership for value added services within two years and paging services in three years. The government announced, in addition to the agreements, to open its mobile phone market earlier as aimed in the negotiations.

It remains unclear, in which way providing of internet services will be reformed in the next years. Up to now, access to the internet is still under control of state-owned enterprises like China Telecom and China Unicom. Equal rights for private enterprises in this sector would speed up the variation of services and the growth of this sector. It seems, however, that the government prefers the control over the information flow to the fast growth of most profitable part of the telecommunications sector.

3.3 Growth

China's government managed it to stabilise the growth in all areas of telecommunications, network infrastructure, users and services. For the first half of 2000 it is reported that China increased its number of fixed telephones with 100,000 a day, which means 19 million for the first half. The fixed network has today about 127 million customers, 82% of which have phones at home. There are 84.3 million urban customers and 43.0 rural customers (People's Daily 2000i).

China's mobile phone market is still the fastest growing in the world. The number of mobile phone users in China increased in 1999, by 18 million to a total number of 43 million at the end of 1999. In the first quarter of this year China had 51.7 million cellular phone subscribers and exceeded Japan as the number one in the Asia-Pacific region. In the whole region the growth of mobile communications was very dynamic, with an increase of 47% for the first three months compared to the same period in 1999 (People's Daily 2000a). Expecting a similar trend in 2000, the number of mobile phone users in China will reach 70 million at the end of this year (People's Daily 2000c).

In 1999, China's telecommunications industry realised a growth of 24.6 percent in business revenues (People's Daily 2000d). China's tele-

communications sector contributes with about 30 billion US\$ to its GDP, which is a share of about 3%.

The growth of China's information contributes as an important factor not to the promotion and structural change of other industries as well. The increasing technical competence, which is embedded in the use of advanced technologies pushes not only the sector itself, but increased the economy's total productivity and the encouraged the development of domestic technological products. The growth of all sectors in the information industry is still on a high level – and was high even in the period of Asia's financial crisis. The growth rate remains stable above 20%, and exceeded the growth of GDP for most of the last years. The business volume of both, electronics products manufacturing (including software) and telecommunications tripled in the period from 1995-1999. Software production alone reached a volume of about 5 billion US\$. In 1999 China produced about 4 million personal computers and 23 million mobile phones (People's Daily 2000h).

4 Telecommunications Equipment Industry

The increasing demand for telecommunications equipment, ranging from telephone handsets to infrastructure construction, the inflow of foreign capital and the increasing number of international co-operations led to the development of an domestic communications equipment industry. There is a number of quickly growing communication enterprises of a considerable level of technological competence. And those enterprises reached a remarkable size, even if compared to the international competitors: the largest of them, China Putian Information Industry Group Co. ranks the 20th in the 50 top giants of telecommunication equipment manufacturers in the world (People's Daily 2000c).

After a long period of a nearly negligible domestic industry for – especially high-technology – telecommunications products and a substantial dependence from imports, the development has now an extraordinary dynamic. The Ministry of Information Industry published a

turnover's growth of the information technology manufactures of 33% for the first five months of this year and an increase of exports of 43% within the same period (People's Daily 2000c). The information technology industry plays different roles in the uneven developed regions of the country. In the urban coastal areas the industry is becoming more and more substantial. In Shanghai, for example, information technology industry contributed with more than 6% to the local GDP in 1999. It is estimated that in 2005 it will become one of the city's key industries with a share of 15% (People's Daily 2000k).

The shift in technological competence is obvious in the computer manufacturing industry. In the first five month of this year, China doubled its production compared to the same period in the previous year to a figure of more than two million personal computers (People's Daily 2000c). The export of computers in the first half of 2000 jumped about 666% to nearly one million compared to the same period in the previous year. Within this time the figure of imported computers dropped about 9% which results to a share of 12% of domestic production. Regarding the whole year 2000 it is expected that every third computer is produced for export. It is remarkable that under the main importers of Chinese computers are mostly high-income countries: USA, Hong Kong, Netherlands, Japan and Singapore. The average price of the exported computers, US\$ 397 – compared to US\$ 677 for imported computers – , indicates that the computer industry has its advantages still on a mid-tech level (Heise Online 2000a).

The development of the domestic mobile phones manufacturers⁴ has a similar dynamic. In 1999 it was all but impossible to find a local manufactured mobile phone in the market, such handsets had a share of <2%. Since then, however, the domestic industry developed very fast as a result of substantial efforts in own research and development in the last years. For the mid of 2000 a share of 10% is reported and a share of about 15% is expected at the end of this year (People's Daily 2000j). The

4) The first domestic manufacturers were Kejian (Shenzhen) and Eastcom (Hangzhou), both co-operating with foreign partners.

demand for domestic mobile phones exceeds the supply so that a higher share would be possible if the local manufacturers manage to increase their production. The technological level of domestic mobile phones is varying: most manufacturers produce handsets which compete on a low or mid-tech level, but some have high-end products like WAP mobile phones for internet access as well (People's Daily 2000j). The increasing number of domestic products is as well seen as an indicator of the rising confidence of China's customers to technological products sold under Chinese brand names.

The recent developments in the telecommunications sector and the liberalisation and deregulation of the sector attract foreign investors in a large scale. With the opening of the services operators market to foreign investment according to the WTO agreement, this trend will be strengthened in the short run.

The global players, still dominating China's mobile phone market, react to the changes with new products: Ericsson plans to offer a new low-cost mobile phone in co-operation with Panda Electronics, a local manufacturer, for a price of 999 yuan (about US\$ 120), a price which is about one third lower than the cheapest Ericsson phone up to now.

The German technology company Siemens, for example, plans investments throughout Asia in the amount of more than 1.5 billion US\$ until 2002 in order to expand its market share in mobile communications in the region from currently 8% to 15%. More than 40% of Siemens' sales in GSM infrastructure are made in Asia. Two-thirds of the amount is announced to be invested in China. China is a very important market for the mobile communications branch of Siemens: China absorbs about one third of its international sells (People's Daily 2000l).

Investment in high-end technology is regarded as the key to China's market. Siemens invests in the so-called "third generation" mobile networks, which allow a higher level of integration of the various services,

5) Siemens ICM (information and communication mobile group)

e.g. a fast connection to the internet. China is regarded as an important market for m-commerce – the mobile form of e-commerce. The widespread use and acceptance of mobile handsets, opposite to the small number of computers, could make China to one of the first countries using this advanced technology. Critics argue, however, that most of the mobile phones are not internet-ready and that customers aren't willing to pay the higher price for a high-tech mobile phone.

5 Conclusion

In review, China's policy on the telecommunications sector must be seen as extraordinary successful. With a balanced system of reforms, restricted competition, controlled foreign influence, regulated prices improving and enforcement of the domestic equipment industry, China managed to increase products and services in both, quantity and quality.

China followed a strategy of gradual deregulation and limited liberalisation, considering the relative maturity of the telecommunications industry over the years. The first years were characterised by massive investment by a ministry which combines two functions: the regulator and the monopolistic operator. It was the policies aim to promote a fast growth in the telecommunications sector, which should help to increase China's GDP: Investments and growth were concentrated on some areas.

With these strategy a basic and very effective network grid with high capabilities for the most developed areas was established up to 1993. In a first reform step regulator and operator were separated and a new telecommunications company was introduced. Other operators arose, most of them working on a half-legal basis, but the government was unwilling to stop such practices. The expected new competition was very limited, however, due to the behaviour of the regulator, who gave preferential treatment to the former monopolist.

Asia's financial crisis and the fear of economic decline – or at least a substantial slowing of growth, led China's government to introduce far-

reaching reforms within a very short period: *firstly*, to introduce with the Ministry of Information Industry a new future-orientated decision maker who reflects the technological convergence of the digital era. *Secondly*, the government implemented several measures of deregulation: the former monopolist was break up and its competitor gained preferential treatment with the aim to build up a competitive telecommunications industry for all types of services. *Thirdly*, a limited liberalisation of the market was introduced, with new competitors and an adjustment of service fees and charges.

As a result, the development of the telecommunications sector was negligible influenced by Asia's financial crisis. The speed of growth in all parts of the communications industry increased. Moreover, a new dynamic in the sector was initiated with new competitors, new products and new services. The digitalisation of communications allowed the convergence of different types of media and established a new information industry.

The reforms led also to the appearance of domestic telecommunications equipment manufacturers. Producing on a considerable high technological level, those manufacturers managed to cover a fast growing market share within a short time. Up-to-date products for low prices attract the Chinese customers and will probably be produced for export in the near future.

Considering the role of telecommunications as a growth engine for China's economy, the impact of telecommunications on stabilising the growth of the overall economy during the crisis cannot be underestimated. Moreover, the huge demand for telecommunications equipment for both, the user's needs and the infrastructure construction, helped to compensate the sales of neighbouring countries, which are more affected by the crisis.

New reform pressure arises from the near WTO access. The gradual, but limited opening of communications networks for foreign investors will increase the level of competition and enlarge the incentive for innovative

products and services. Global investors will give China's telecommunications market a new push.

The gradual reform of China's telecommunications industry seems to correspond with Schumpeter's view on temporary monopolies. In his view, monopolistic practices cannot be condemned per se but need to be seen in a broader context. The enormous risks and investments needed for new products and technologies can often only be handled by large enterprises (Bauer 1997). Under some circumstances larger enterprises could contribute with innovations more to the creation of dynamics, while price competition could result in a static economy. For a dynamic economy it is not perfect competition that matters, "but the competition from the new commodity, the new technology, the new source of supply, the new type of organization" (Schumpeter 1942: 84). It is a type of competition, which occurs as a threat of a new market entry. Temporary monopolies play an important role when innovations in the form of new technologies have to be introduced, which are often not compatible with the technologies used before. For the regulator it is essential to indicate the time when a monopoly doesn't create dynamics any more, but hinders new enterprises to enter the market with new products and services.

The gradual and limited reform steps of institutions and enterprises – China's way of deregulation and liberalisation – increased both, the use of telecommunications and the technological level of the industry. One of the key questions in the future will be how China can force the use of telecommunications in the less developed regions of the country within the framework of liberalisation and deregulation which is reached in the telecommunications industry.

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