Innovation and growth in China

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Introduction

China's economic growth is without historical precedence (average growth was 11.7% per annum for the period 2003-2007). Even after the financial crisis 2008, which left Europe and the United States in a state of low growth and high rates of unemployment, China has maintained annual growth rates in GDP of around 8-10%. Will this continue or have we witnessed a 'normal' historically bounded episode of catching up with the West? Eichenbaum, Park and Shin (2011) presents historical data on growth paths for a number of countries and on this basis they argue that growth will be significantly reduced, when China's national income per capita reaches a level equivalent to around 17,000 US-dollar - 2005 prices; a level China will reach already around 2015.

It is not unproblematic to build quantitative laws on the basis of historical data. It is especially problematic without taking institutional and political conditions into consideration. One can, for instance, not exclude, as one possible scenario that China enters a politically unstable period, where growth goes completely to a halt. The gradual liberalization of its financial market and its opening up of its financial system is not without risk and if going ahead too far or too quickly it can trigger economic crisis. Alternatively, if this does not happen, the unique institutional relationships within the Chinese economy, in combination with a politically driven strategy aiming at a shift in the current growth trajectory toward endogenous innovation may if it succeeds result in a continuation of the exceptional high rates of economic growth.

In this article, we look at how China has engaged in massive investment in knowledge and in particular in investment in research and development. The political leadership has given priority to the investment in science and technology while Chinese citizens for cultural and economic reasons invest heavily in upgrading the skills of the next generation. This can be seen as a uniquely ambitious attempt to realize a 'knowledge based society' and as an attempt to shift from one growth trajectory to another without a significant reduction in growth rates. Key concepts in the new strategy are 'harmonious development ' and ' independent innovation ' (Gu and Lundvall 2006b). These concepts signal that the Chinese leaders are aware that the current growth pattern is not sustainable.

So far economic growth has reflected extremely high rates of investments capital and on rapid growth in export-oriented manufacturing bolstered by a favorable exchange rate. This development strategy has given a significant boost in the standard of living of large sections of the population. But it has also led to social problems, growing regional inequalities and serious environmental problems; both the health of people and the natural environment has been put at risk. Seen in relation to the outside world, it has resulted in political friction and in the threat of trade war. The enterprise sector has been successful in importing technologies but the enterprises' own capacity to develop and exploit technological opportunities has not been impressive.

This is why the Chinese leaders increasingly have stressed the need for 'endogenous innovation' and 'harmonious development'. In this article we first track the history behind the current shift in strategy, second we focus on China's current investment in science, technology and innovation and finally we discuss what factors that will determine the success of the new strategy. The presentation is based on a number of earlier publications in which we have highlighted various aspects of China's innovation system, innovation policy and long-term plans (Gu and Lundvall 2006a and 2006b and Gu et al 2009) as well as on a more recent unpublished analysis of China's position in the global research landscape (Lundvall 2011).

We begin the article with an analysis the reform wave at the beginning of the eighties laid the foundation for the dominant growth model. Then we look specifically at the reform of research and innovation system and innovation system that was began around 1985. We finish with a presentation of the latest long-term plan for science and technology and with an attempt to assess the extent to which this plan, together with other reforms can be expected to change the development direction and at the same time maintain high growth rates. One conclusion is that while the Chinese leadership at the central level seems ready to engage in radical reform and have a strong record in terms of policy learning it is far from certain that they will succeed in initiating the change in behavior at the regional and local level that is necessary to realise the change in direction.

The major reform wave and the institutional transformation

When Deng Peng Hsiao 1978 came to as successor to Mao Tse Tung, there was a dramatic shift, both in theory and in practice. His main message to the Chinese population was that it is legitimate to seek material welfare. He presented a kind of ' trickle-down ' theory, where the wealth of a few in the long run would benefit the entire population. This ideological message stood in sharp contrast to the cultural revolution's calls for moderation and modesty. The message was soon followed up by economic reforms in agriculture and industry that decentralized decisions and gave more room for market-oriented production (Gu and Lundvall 1996b).

The wave of reform, which started around 1980, had three main elements: Decentralisation, privatisation and the opening up of the economy. Decentralization gave more freedom to local authorities and enterprises. Increased market orientation and various forms of deregulation gave more room for competition to the SOEs (State Owned Enterprises). To begin with it was mainly 'municipal enterprises' (Township and Village Owned Enterprises) which took market shares from the State-owned enterprises. But gradually private enterprises, including foreign-owned enterprises came to play a greater role. 2003 the three categories each stood for about one third of total industrial output.

The combination of the ideological message and the economic and political reforms served to liberate an oppressed entrepreneurial potential in the population. This was the case especially in densely populated regions, such as Zhejiang, where there was neither easy access to land and natural resources, nor to large scale industry. Some of Chinese-owned entrepreneurial firms that were founded have grown to become world's leaders in their sector (Huawei within telecommunication equipment is one significant example). At the same time there was strong growth in foreign direct investment. To begin with these investments came mainly from wealthy groups in Hong Kong and Taiwan who were interested in moving labor-intensive production to China. They were attracted by low wages and specific local advantages, sometimes in the form of special 'free zones for export production'. It was not until later that China's large and rapidly growing domestic market for consumer durables and capital goods attracted foreign capital from the West's world leading multinational companies.

The economic and political transformation which followed in the tracks on the various reforms laid the ground for a distinctive institutional set-up which is reminiscent of a feudal system where there is a kind of fusion at the local and regional level of economic with political power. The economic reforms, including decentralization of the right for local authorities to dispose over the means gathered through local taxes, gave strong incentives for regional authorities and power groups, including the Communist Party's local branches, to engage in investment projects carried out in close cooperation with private stakeholders – Chinese as well as foreign (Qian and Weingast 1996; Saich 2004).

We see this distinctive institutional framework as one essential prerequisite for the extremely high investment and savings rate in China and thus, also for the exceptional rates of economic growth. In the last decade, China has annually invested *about half of the national income*. There are several factors which could explain the extremely high accumulation rate. The savings of households to finance the education of the young generation and to compensate for the absence of public welfare for old people is reflected in high savings rates resulting in low capital costs. But we see the concentration of economic and political power at the local and regional level as the most important *driver* behind the process.

This implies in turn that the current high rates of economic growth are regionally anchored and therefore not under full control of the central management (Saich 2004). There are strong regional interests attached to a continuation of the current growth model and also to the continuation of what might not be sustainable in it – the over-exploitation of natural and human resources as well as the weak innovation performance. In the final section of the paper we will return to this issue since we see it as the most challenging for the efforts to enter a new kind of more knowledge-based growth trajectory.

The reform of research and innovation system

Historically, developing and practising technical knowledge has not have been seen as a privileged activity in China. Confucianism regarded the knowledge within arts and statesmanship as more prestigious than technical knowledge. After the Communist State was consolidated there was a significant shift in this respect. The political attempt to establish autonomy and independence also in the field of technology and the Marxist understanding of science as a productive force were factors that gave a new kind of priority to scientific and technological research. Between 1951 and 1958 research intensity (i.e. the share of national income which is used for research and development) increased from from 0.1% to 1.0% and through the sixties and seventies it remained at a high level (between 1.0 and and it went up to 2.8% during 'the great leap') (Gu 1999).

While the reforms in agriculture and industry took place respectively 1978 and 1980, it was only in 1985 that the first significant reform of the research system took place. Around 1980 there existed a very extensive and complex national research system in the form of 4.690 different research institutes operating at national or regional level. To this may be added approximately 3,000 locally anchored institution. 323.000 researchers and engineers were employed by these institutions.

The reform was adopted 1985 by the Communist Party's Central Committee under the heading "Reform of the management of Science and technology system (Gu and Lundvall 2006b). The main theme for this reform was changed relationships between the institutions that produce knowledge and industrial users of knowledge. The ideas behind the reform were 'systemic' and based on a quite sophisticated diagnosis of the weaknesses of the existing system. The starting point was a system with separation of industrial research centers from the producing companies. All research institutes, with exception of those belonging to the Chinese Academy of Sciences were subordinated to a specific sector Ministry. The same sector Ministry was in charge of production enterprises operating within the sector. Ministries thus had both R & D and production under its control. This design was inspired by the Soviet Union and it did not differ from what was applied in all the other centrally planned economies.

In the context of the reform the then Prime Minister Zhao Ziyang gave the following interpretation of the reform's background and objective:

> *….. However, there is growing evidence to show that the system can no longer accommodate the situation in the four modernizations programme, which depends heavily on scientific and technological progress. One of the glaring drawbacks of this system is the disconnection of science and technology from production, a problem, which is a source of great concern for all of us....*
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> *By their very nature, there is an organic linkage between scientific research and production. For this linkage a horizontal, regular, many-leveled and many-sided channel should be provided. The management system as practiced until now has actually clogged this direct linkage, so that research institutes were only responsible to the leading departments above, in a vertical relationship, with no channels for interaction with the society as a whole or for providing consultancy services to production units. (Zhao Ziyang 1985).*

The reform included several elements but the main objective was to establish a better relationship between the supply and the demand for knowledge. The intention was through the positive and negative incentives to get the formerly centrally directed institutions to act as sellers and producing companies to act as customers. In order to achieve this, institutes were given more freedom to act on their own. At the same time there was a reform of the system of distribution of public resources so that they were distributed more on the basis of 'excellence'.

It soon turned out that the desired conversion did not take place. The institutions' ability to market their knowledge and the industry's ability to buy knowledge proved to be insufficient. The experience illustrated the fact that when it comes to knowledge transactions 'market failure' is the rule rather than the exception. The Chinese leadership had originally overestimated the capacity of the market mechanism to solve the problem. When subsidies to the institutions were reduced and their freedom to act was increased the outcome was not what was originally planned. Some institutions just disappeared while others were integrated into manufacturing companies. But the new dominant form was one where the research institutions, including universities, started to establish their own enterprises that delivered tangible products to the market. Lenovo, the firm that a few years ago took over IBM's division for personal computers, is just one example of how Chinese universities and research institutes with success created world-class enterprises (they may be referred to as spin-on rather than spin-off enterprises).

The year 2000 planning authorities made a status of the different forms of conversion of institutions that had actually taken place. It showed that around 1,200 institutions had changed status. 300 had been merged with the production enterprises. 600 had been transformed into market-oriented enterprises. A minority had been integrated into a University. The original intention which was to create markets for knowledge and technology was only realized to a limited extent: Turnover in markets for knowledge in the form of licences etc. corresponds to less than 10% of the turnover institutions ' spin-off enterprises (Hong 2008).

The history of this reform of the Chinese research system illustrates the capacity of the Chinese leadership to engage in reform and in ‘policy learning’. First, it is interesting to note the extent to which the Chinese leadership already 1985 understood technical innovation as a systemic process, where the actual linkages between scientific production and material production are seen as essential for the system's ability to innovate. Second, it is interesting to note how the Chinese leadership reacted to the failed attempts to create markets for knowledge and technology. They reacted mainly by a gradual revision both of the objectives and of the design of reforms taking into account what de facto seemed to work in practise. What originally looked as deviations from a centrally-set norm (institutions merging with manufacturing companies and spin-off companies from universities) were gradually recognized and presented as a new legitimate standard that others should follow. We see this kind of pragmatic policy learning as an important factor explaining why China, in contrast with Russia, succeeded to move in the direction of a market economy without seriously undermining its research and innovation system (Gu and Lundvall 1996a).

What came out of the reform?

While the impact of the economic reforms in terms of economic growth is impressive the effect on innovation performance more mixed. As we shall see China has managed to mobilize major resources to the development of technology and science — again, there is talk about historically unique growth rates. On the other hand, the effort has not yet been converted into strong innovation capacity in the enterprise sector. The majority of the enterprises operate on the basis of mature technologies that have been imported from abroad or copied from other Chinese companies.

As shown in table 1 which covers the period from 1990 to 2007 China's share of the world's total R & D effort has increased from 3% to approximately 9% and research intensity has grown from less than 1% to around 1.5% (Arond and Bell 2010). This should be seen on the background that growth in GDP has been very high in China and for the period 2000-2007 China experienced *an annual rate of growth in the resources used for research and development of 20% per annum*. This may be compared with Europe and the United States where the R&D-effort stagnated for the same period.

Table 1: China's R&D-effort seen in global perspective, 1990, 2000 and 2007 (share of world total R% amp% D and R & D as a percentage of GDP).

	1990		2000		2007	
	Share	R&D-int.	Share	R&D-int.	Share	R&D-int.
United States	38.2	2.3	37.2	2.3	34.7	2.3
Japan	16.3	3.1	13.0	2.9	13.0	3.4
China	3.0	0.8	6.7	1.0	9.2	1.5

Source: Arond and Bell (2010)

This massive increase in the investment in research is reflected in a growth in China's contribution to the global scientific production and to the global production of scientists with doctorate (Veugelers 2010). Table 2 shows that while the scientific production, measured in number of publications is stagnating in the West and Japan it grows it with more than 16% per year in China. During the 15 years the contribution from China to world increases from 2% to almost 6%.

Table 2: China's contribution to scientific production, 1990, 2000 and 2005 seen in global perspective (Share of the world's total scientific production and average annual growth rate).

	1995	2000	2005	Annual growth 95-05

United States	34	31	29	0.5%
EU	35	35	33	1%
Japan	8	9	8	2%
China	1.6	2.9	5.9	16.5%

Source: Veugelers 2010

Table 3 shows a similar pattern with regard to the number of doctoral degrees awarded. In the West and in Japan is stagnating while it grows by almost 19% per year in China.

Table 3: Number of doctoral degrees awarded 1995-2003, and annual growth rate 1995-2005.

	1995	2003	Annual growth 95-05
United States	41.747	40.740	0.4%
Germany	22.387	23.043	1,5%
Japan	12.645	16.314	2.9%
China	4.364	18.806	18.7%

Source: Veugelers 2010

In addition, China sends a large number of students to study outside the country's borders. The total number of students who studied outside their own country was 2005 around 2.7 million. More than 400,000 came from China (Veugelers 2010). A large proportion of those who studied in the US settled more permanently in the and today researchers with Chinese background constitute approximately 10% of the total population of researchers at US universities. Very ambitious incentives to lure the most prominent among these researchers back to China is an important part of Chinese research and innovation policy.

Especially after 2000 there has been an explosive growth both in investment in research and in the immediate results in terms of volume of publications and the number of doctoral degrees. All growth rates are close to 20% and to be compared with stagnation in the West and in Japan. An important issue is about the quality of the output of these impressive efforts. For instance the presence of Chinese contributions in the most prestigious journals is less impressive. But it does not alter the fact that the level of the effort are far above what we find in Europe and the US. Also in Europe there has been a discourse on the knowledge-based economy but this discourse has not been translated into political action. For Europe the most conspicuous failure is that the widely cited Barcelona objective of 3% in R&D- intensity has not been reached. In the period 2000-2010 the level remained unchanged at approximately 2%.

In China there are two factors which contribute to the high level of ambition. One is a political leadership at the central level that sees knowledge and innovation as the main driving force for future growth and the other is a population where families see education as the only certain road to social advancement. This may be reinforced by the fact that China, including the Communist Party, is a meritocracy where advancement is based upon success in education. The next decades China's growth record will give insights in the real potential of a strategy that aims at knowledge based economic growth.

But China's innovation performance is less impressive

Various indicators suggest that so far the massive investment in research only to a limited extent has been translated into corresponding innovation performance in Chinese enterprises. One indicator which allows for comparisons across countries is the frequency of different types of patent applications. This indicator is far from unproblematic since institutional and historical conditions will affect the propensity to legally protect new technologies. As regards China, we must bear in mind that a regular legal framework for the protection of intellectual property was introduced only a few decades ago. Therefore, we must assume that also for this reason, Chinese enterprises may lag behind Western firms when it comes to patenting. Nevertheless, we find that the gap between China and the West is surprisingly big.

Boeing and Sandner (2011) associates the patent quality with the geographical coverage of the patents. They distinguish between three different types of patents:

Patents covering the United States, Europe and Japan.

Patents covering one or two of these areas.

Patents only covering China.

Patents of high value signaling global marketing ambitions would thus go in the first category while patents of the lowest value are those seeking protection only within China.

Boeing and Sandner (2011) shows that there is only a handful of 'Chinese' patents in the first and most advanced category. 2005 only 25 enterprises active in China and of these 25 applications 22 came from foreign companies operating in China. There were thus only three patents of this type which originated from companies owned by the Chinese owners. This should be compared with 600 applications from companies in Germany and 1,700 from the United States in the same category. In fact, only three Chinese companies are active within this category (telecommunications companies, Huawei and ZTV, and BID developing technology in connection with batteries). In the middle category the gap is less dramatic but China's number of patents constitute only, respectively 14% and 5% of the number of applications from, respectively. Germany and the United States. Within all categories growth rates for the number of patents are high but with a low starting level share of global patenting remain quite small.

Another indicator that points in the same direction is China’s export specialisation in high technology products. It turns that no less than 80% of China's growing export of high-tech products such as electronics originates from enterprises that are partially or fully owned by foreign capital.

Studies at the enterprise and sector level give certain insights into why the average Chinese company is not very innovative. Large State-owned enterprises (SOEs) have a tendency to engage in technology import in the form of finished packages (black boxes) and this does not help them develop their in house capacity for innovation. The ability and incentives for management to take a long term view and to develop innovation management have been limited. One reason is that in SOEs taking up management functions for a period have been seen as part of a political career (Liu and Tylecote 2009). Engaging in joint ventures with foreign companies have only had a limited positive impact on Chinese companies’ ability to innovate on their own (Lin 2006).

Alcorta, Tomlinson and Liang (2009) presents results from a survey covering 300 Chinese companies in Jiangsu. Their study confirms that the vast majority of enterprises practise passive strategies and prefer to apply technologies which have already been thoroughly tried out by other firms tested. There are no examples among the companies they study where the company as a whole get engaged in the process of transformation and organizational learning.

But this predominantly negative image does not give the full pecture. Most sectors include companies that stand out by being competitive on the basis of their own innovations. Within the electronics and telecommunications, this is true for Lenovo, Huawei and ZTW and within the automotive industry it is true for Chery and Geely (Liang, Lin and Wu 2009). These enterprises now act as transnational companies on a global level with massive investments outside China. They are seen in China as model companies that illustrate that there is a large untapped potential for innovation based economic growth.

We must nevertheless conclude that the massive investment in science and technology have so far only to a limited extent resulted in corresponding increase in innovation capacity in Chinese-owned businesses. One can see this either as an expression of the permanent system failure, where bureaucracy and state ownership block entrepreneurship and creativity, or as pointing to an enormous potential for innovationbased growth. Not surprisingly the Chinese leadership stick to the second perspective. The development of China's 15-year plan for science, technology and innovation illustrates the ambition to unlock this potential for innovation.

China's investment in independent innovation

Years 2004, 2005 and 2006 marks another significant shift in China's research and innovation policy. There is a strong on making future growth much more based on innovation and at the same time the innovation system is to be reformed so that it promotes 'endogenous'. In October 2005, the Communist Party's Central Committee presented a vision for the 11th five-year plan for national economic and social development. Here the emphasis was upon resource savings, a movement toward more advanced products, strengthened innovation, environmental improvement, regional balance, and as well reduction of inequality. The vision presents 'endogenous' or 'independent' innovation (*-chuang zi-zhu-xin*) as a key to achieving these objectives (State Council 2006a; State Council 2006b).

In January the following year China's president, HU Jintao, gave an important speech for the National Conference for Science and Technology under the heading "“Build an Innovative Country by Endogenous Innovation with Chinese Characteristics.”[1] In the speech he clarified the objectives that the forthcoming long-term plan for science and technology must meet. The plan was published in March the same year (National Medium-and long-term Science and Technology Development Plan 2006-2020). The new strategy is referred to in China's media as a *strategy for innovation-based and harmonious development* (socially, economically and environmentally).

The new strategy was developed in response to a number of challenges that the previous growth model had made increasingly more obvious. The social and environmental costs had grown, the export-oriented strategy ran into growing trade political obstacles and at the same time the industrial structure was only slowly getting upgraded in the direction of products with high value added. In addition, came the fact that massive investment in knowledge only to a limited extent had been translated into innovation in Chinese enterprises. The new strategy reflected debates in political and academic circles about whether a continued exploitation of China's comparative advantages was the right choice or whether there was a need to create a new basis for future growth.

These debates placed concepts such as innovation and innovation system (Lundvall 1992; Nelson 1993) centrally and the new plan was built around a definition of China's innovation system defined as “a social system where the State has a coordinating role, the market plays a significant role for the allocation of resources and different organizations/actors are closely coupled, as well as committed to effective interaction.” For the first time the plan emphasized that enterprises should be regarded as the most central component of the innovation system. A distinction was made between four subsystems:

- The national system for the production of knowledge (universities, training and research departments)
- Military innovation system, including technologies for simultaneous use in the civil sector
- Regional innovation systems

- The service sector that support innovation

There are two types of initiatives in this plan. The first type focuses on investments in science and technology within specific areas. The second type includes proposals for change in institutional arrangements and in legislation. The plan is quite detailed and concrete in both these respects.

The main part of the plan is about where to invest in science and technology. The priority projects are presented at three levels. The first level takes as its starting point societal needs and includes 68 projects which are grouped in 11 different societal demand areas. At the second level 16 big-scale national prestige projects are proposed. The third level proposals are based on a strategic assessment of the potential in various areas of science and technology. Here 27 cutting-edge technologies, 18 fields for advanced scientific research and four basic science projects are presented.

On the basis of our prior analysis the second type of initiatives where the focus is on institutional renewal is perhaps even more critical for the success of the over all initiative. Already during the construction of the over all plan some institutional renewal took place. The preparation rallied a very broad combination of ministries. With regard to the plan's implementation, it is interesting to note that MOST (Ministry of Science and Technology) does not appear as the main actor. In fact, the Development and Reform Commission (NDRC) has the responsibility for implementing the biggest number of the 99 initiatives (29), while the Ministry of finance is responsible for 25 and MOST for 17. These many initiatives cover change in the rules for taxation of investment in R & D, intellectual ownership, governmental procurement and much more. It is worth noting that within each single initiative is designated both an institution and a person as main responsible for the implementation. Finally, it should be noted that China's prime minister, WEN Jiabao played a leading role for the coordination of the plan and that he decided to postpone its publication until it was sufficiently concrete in form.

Will endogenous innovation rescue the Chinese high-growth strategy?

In other contexts, we have analysed the new long-term plan in detail and raised a number of critical questions (Gu et al. 2009). First we see it as crucial that 'endogenous innovation' does not lead to a primitive techno-nationalism where the openness of the innovation process is threatened. What is needed are reforms in incentive systems, work organisations and management styles that strengthen the innovation capacity in the Chinese companies and that make them competent to deal with multinationals on an equal basis. In order to achieve this, there is not at least a need for a renewal of corporate governance. This may involve giving even more room for private enterprise but it is not only about private enterprise. To instal an innovative culture in state-owned companies is equally important.

The problem which the 1985-reform attempted to solve – the weak linkages in the innovation system - is still relevant. Here is the plan still too dominated by a supply perspective, where it is assumed that investments in research is sufficient for innovation, and a strategy to strengthen interactive learning internally and between organisations is lacking. Knowledge is too narrowly defined as something arising out of, scientific research, and there is too little emphasis on experience-based learning and on how employees get involved in processes of change (Jensen et al. 2007).

It is positive that the innovation strategy is linked to the achievement of social objectives which aim at harmonious development and to the great untapped opportunities for Chinese companies to innovate with starting point in niches within the domestic market that the multinational companies do not see as profitable. Here the progress of the telecommunication equipment giants Huawei and ZTV represent interesting models for such a development. They both started to develop technologies which addressed needs in the province before entering technologically more demanding and global markets.

There is complementarity between such business strategies and a necessary reorientation of the entire Chinese economy away from its extreme dependence upon export markets. This would also allow a gradual re-evaluation of the Chinese currency which would put a somewhat stronger innovation pressure on export-oriented enterprises.

Regardless of weaknesses in the strategy ambitions are great and the mobilisation of political resources behind the waves of investment in innovation-based growth is impressive. This reflects that China, including its political leadership, have great confidence in *technology and science. This may reflect the fact that no less than 8 out of 9 members in the most important power centre The Politbureau of the Central Committee have an degree in natural science or engineering.* While economists through their subjects have a conservative tendency in the direction of taking advantage of (and thereby reproduce) comparative advantage, engineers have a greater optimism when it comes to the possibility to construct new competitive advantages. Here one can see a parallel to the debate on Japan's development strategy that took place in the 1950s where the engineer-dominated MITI (Ministry of trade and industry) came through with a strategy to buil the automotive industry and electronics, in opposition to the economist dominated Bank of Japan (BoJ) who insisted that Japan should maintain its specialisation in labour-intensive products (Freeman 1987).

Optimistic action orientation will, of course, from time to time lead to errors and failed experiments. But our historic review shows that the Chinese leadership has managed to engage in ' policy learning ' which pragmatic reforms from the outside has adapted what works in the training (Gu and Lundvall 2006a). Against this background, we cannot exclude that Barry Eichengreen and his co-writers are mistaken when prophesying a slowdown of growth in the near future. We see many signs indicating a great innovation potential in China and there are powerful political forces committed to releasing the potential and to harvest on the basis of the investments made in R&D and scientific training. In any case, it will be interesting to follow developments in China the next ten to fifteen years. We see the current shifts as a unique attempt to transform the discourse on the knowledge based society to strategic action. If the experiment succeeds, it will be a task for all other countries to draw lessons.

In any case, it is hardly an income barrier (17 000 USD) which will set limits for the Chinese growth. The great challenge lies rather in difficulties to anchor the new growth strategy among regional interest groups. Many Western observers tend to see China as a monolithic economic and political system in which the Communist Party's central bodies have full control. This image is not correct. With the reforms implemented around the 1980 regional concentrations of merged economic and political power have developed (Saich 2004). These clusters of power are deeply rooted in the growth pattern that has hitherto dominated China. The most important challenge for the new strategy is thus to develop incentives and a political discourse that make regional powers contribute to ' endogenous innovation ' and ' harmonious development '.

Litteratur

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[iii] The title of the speech is read in Chinese as: "jianchi zou zhongguo thesis zizhu chuangxin daolu wei jianshe chuangxinxing guojia is nuli fendou", published on 10 January 2006, refer to the people's Daily Web to http://politics.people.com.cn/GB/1024/4011536.html