The Development of the Automotive Industry in the People's Republic of China and its Consequences for Skilled Work

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Development Status of the Automotive Sector

In terms of the international automotive industry, the People's Republic of China is increasingly gaining importance globally as a business and production location. The booming automotive market with its supply industry is now one of the principal sectors in the economic and technological development of China. As a result of the huge economic growth and the resulting rising purchasing power of the population (1.33 billion citizens), China is already one of the most important sales markets in Asia for the automotive industry. More and more Chinese people are benefiting from the economic boom, so rising incomes inevitably bring new classes of customers with strong purchasing power, primarily wanting to provide themselves with high quality consumer goods including modern cars. As such, in the period from 1991 to 1996, demand for cars rose by an average of 38 percent per year, which resulted in corresponding growth figures in production. Whilst the production mark of one million vehicles per year was just exceeded in 1992, the market increased in 2001 to 1.7 m cars produced and sold per year (cf. Haak 2001). In 2009, according to information from the China Association of Automotive Manufacturers (CAAM), the Chinese motor vehicle market achieved a new record high of 12.9 million vehicles sold (of which 10.3 m were cars), representing growth of 49.4 percent from the previous year, 2008. An ongoing upward trend is also expected for 2010, which is attributable to the fact that a 72% increase in sales compared with the same period the previous year was recorded in the first quarter of 2010 alone (cf. Schaaf 2010). In this, the majority of buyers – between 60 and 70 percent – are currently looking to buy new cars (cf. Habrich-Böcker 2010). Here, the main focus of consumers is no longer solely on small and mid-range cars; luxury vehicles are also seeing strong market growth.

In accordance with the rapid economic growth and the associated constant demand for cars, it is not only the motor vehicle sales market that has experienced huge growth: the Chinese automotive industry is also benefiting from the development. In addition to foreign automotive companies conquering the Chinese market, there are numerous efforts from China to position itself on the market, particularly with its own makes of car, as illustrated by the following brief historical outline. With support from Japan and the Soviet Union in the period from 1938 to 1958, production facilities for

lorries were established in the industrial and commercial centres of Shanghai, Tianjin, Changchun and Nanjing, although the nature of the supply industry was initially very weak. The first national car was produced only from 1958 in Changchun and Shanghai with two models (Haak 2001). Today, China has around 50 different automotive manufacturers – joint ventures with foreign involvement and Chinese producers – producing around 60 different models in the country as well as approx. 100 further imported models (cf. Joas 2004a). Initial contacts with international automotive manufacturers were made at the end of the 70s and the first joint ventures were established in the early 80s. The first western companies to be established were AMC (American Motors Corporation, later Chrysler) in 1983 and Volkswagen in 1985. From the start of the 80s, the number of vehicles in China has risen continuously. As such, the number of vehicles at the end of the 80s amounted to around 5 million (75% commercial vehicles and 25% cars) vehicles, a large proportion of which was imported. In order to prevent a currency drain, the government in Beijing promoted the establishment of modern, domestic car production from the mid 80s.

The aim of the Chinese government was and is to expand the automotive industry into one of the main pillars of the economy and, in the long term, to cover 90 percent of domestic demand from internal car production. The capital expenditure of foreign investors has therefore been limited to half of the equity of the joint venture, which nonetheless does not prevent conquering of the Chinese market by foreign companies such VW, Citroen, Peugeot and Daimler-Chrysler and from the mid 90s increasingly also by Japanese manufacturers such as Toyota and Honda. The rapid growth of the automotive industry and its promotion by the government have resulted in China now being the tenth largest vehicle manufacturer in the world, although the future development of the automotive industry will continue to be driven by the Chinese government. As such, the government in Beijing is planning to expand the Chinese automotive manufacturers into globally competitive group sizes, through mergers and acquisitions such as FAW, SAIC, Dongfeng and Changan. As a result, the production rate should be increased to 2 million vehicles per year in the future. Experts are expecting an overall rise in the current 29 percent market share of domestic manufacturers up to 35 to 40 percent by 2020 (cf. Habrich-Böcker 2010). Where only a few models such as the “F3” from Chinese manufacturers BYD (Build Your Dream) – the sales figures of which rose by 87.6% to 93,000 cars sold in the first quarter of 2010 – are currently benefiting from the boom in the automotive industry, German manufacturers such as Audi, BMW and Daimler in particular are benefiting from the present development. In the first quarter of 2010, for example, Daimler alone achieved an increase of 112% to 23,600 vehicles sold (cf. Schaaf 2010).

However, not only has the automotive industry in China undergone rapid development in recent years and decades, experts also predict that the sales figures will rise continuously and steeply due to constantly increasing per capita income, resulting in the expectation of increasing demand for cars in the future. Whereas only 3.7% of Chinese people earned enough to be able to afford a car in 2002, this figure reached 13% in 2010. Experts predict that around 20 million cars will be registered in China by 2020. Moreover, according to estimates by experts, it is expected that around 29% of present car buyers will opt for a top class car and 55% for a mid-range car, although there is a clear trend towards foreign makes, despite the efforts of the Chinese government to promote and strengthen the internal automotive industry (cf. Joas 2004a). Development to date and the predicted development of the automotive industry in China clearly show the great significance that it will take in China's overall economy in future.

Automotive Service Sector in China

Whereas the automotive industry in China has undergone rapid development and will continue to grow in the long term, there are great deficits particularly in the areas of dealers and service. Chinese car customers complain that there are currently too few and above all too few well-qualified dealers and vehicle workshops. A lack of advice and care, poor workshop service and excessive distances to workshops are currently the greatest points of criticism. Where as the premium makes and high quality mid-range makes with sufficient sales figures operate their own, brand-exclusive workshop networks and attract around 50% of workshop business, customers of other makes and classes are dependent on multi-brand dealers and service stations. Co-operations in the establishment of joint dealer organisations are therefore suited to these manufacturers of non-leading makes, in order to be able to offer customers an efficient network of workshops and service stations and to provide them with satisfaction in terms of service and after-sales business. The dealer network in the large metropolises such as Beijing, Shanghai and Guangzhou is currently already particularly strong. However, it is to be expected that the number of cars will increase in many other cities and the area of service will therefore also grow in these regions if the trend of new car purchases continues as shown in fig. 1, which is predicted by all of the forecasts. According to experts, future growth in car purchases is expected to be 13% in the large metropolises and as much as 17 to 25% in second and third level cities (cf. Joas 2004b).

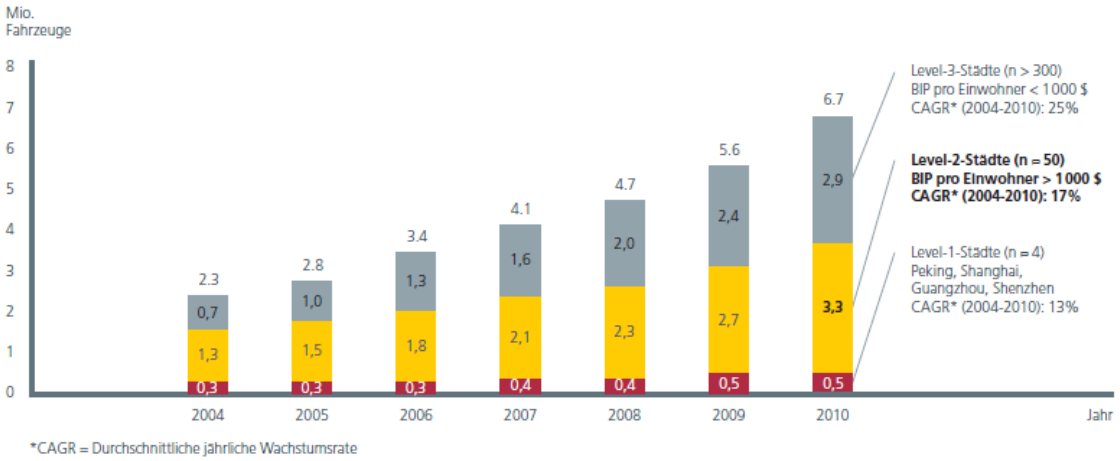

Figure 1: Development of New Car Sales in China by City Size (Source: Mercer Study 2004)

Other than the large manufacturers, which are mainly located in the large metropolises and very well organised in the area of service, there are many smaller, traditional businesses in rural China, to which around 15% of new car sales and 20% of repair work can be attributed. In addition to independent workshops and workshops linked to authorised dealers, ground is being gained by international and particularly Japanese service chains, including the likes of Yello Hat and AUTOBACS as well as Bosch. Even in 2010, such service chains accounted for around a quarter of the service business and they continue to grow. Alongside the currently booming new car trade, the associated service provision and the continual establishment of workshops, growth is expected in the still underdeveloped used car market. This growth is estimated at 20% per year, although it is expected to be concentrated among specialist used car dealers. According to estimates by experts, there are currently around four million used cars traded in China (cf. Joas 2004b). In order to achieve sufficiently high quality in the used car market, the establishment of an efficient and comprehensive network of workshops is essential.

Summary of the Case Studies

Conclusions from the Sector Development and the Case Studies

In order to do justice to the boom in the automotive industry and the associated development of customer demands, it is not enough to merely increase production and import figures and to advance the establishment of a comprehensive service and workshop network. To achieve the highest possible quality in all areas of the automotive industry, particularly in the area of service and repair, it will be essential to have well-qualified specialists. Whereas the large, foreign companies have the latest know-how and necessary innovation potential through well-trained staff, some Chinese manufacturers still neither display an adequate production base and the necessary innovation potential nor have well-trained staff in order to enable them to be competitive in the market in the long term. Companies that recognise this trend and invest in the training of their dealers and mechanics frequently encounter the problem that other manufacturers headhunt well-qualified staff from them. This trend implies that there is still a great need for action from the state in terms of training and qualification for specialists in the automotive industry and in the service and workshop areas. As the analyses in the context of the ERS project have shown, there are indeed various options in China for the completion of training both in the automotive industry and in the area of service, yet it is currently impossible to meet the expected demand.

The analysis showed that foreign manufacturers with production locations in China are sponsoring the training of young specialists in order to meet their own demand for well-qualified specialists. The training is given at vocational schools, colleges and universities, in manufacturer's internal classes and it is very strongly orientated towards the standards of the respective manufacturers and the products/makes of the same. Broad basic knowledge is passed on to the future mechanics and sellers in the colleges, although this is done on the basis of the manufacturers' requirements and quality standards. In order to guarantee high quality training, educating institutions are equipped with the latest technology and training facilities, which are used primarily to convey manufacturer-related know-how. In addition to these special "manufacturer classes", however, there is the option of completing training as a mechanic/seller independently of a manufacturer. The extent to which this differs from the manufacturer-linked training cannot be conclusively assessed from the analyses. This requires detailed consideration of the different training opportunities and the corresponding curricula. However, it must be assumed that there is a need for action in manufacturer-based mechanic training with respect to the quality of

training, as there are currently few quality standards or legal provisions in the area of service in China for workshops and the work performed there.

The brief insights into the workshops revealed that the staff of independent service workshops are currently managed predominantly by people who have acquired the technical knowledge through learning by doing or informal learning. Only some of the mechanics employed here have a partial qualification or are fully trained as mechanics. The quality provided is therefore low, whereas the demand for qualification is high. In the area of car production, there is great emphasis on quality. As shown by the case studies conducted at Beijing Benz Daimler Chrysler (BBDC) and Beijing Auman Heavy-Duty Truck Plant, Beiqi Foton Motor, both companies rely on their own qualification strategies. Whereas BBDC relies on a few employees with a broad knowledge base and a high level of qualification and particularly on employees with special qualifications for specific tasks, Beigi Foton Motor emphasises the value of employees having a broad knowledge base and a variety of qualifications.

The specialisation of the staff at BBDC is therefore based on the fixed production structures and the operating areas of the employees. To meet the high quality standards of the manufacturer, the entire production is subject to fixed procedures and to the linking of different working areas. The quality in the individual working areas is then ensured both by specially trained employees who check the quality at the interfaces and by employees in final inspection, who are also trained specifically for their operation. One possible need for qualification at BBDC arises if the production is reorganised due to increasing vehicle sales and due to customer demand for new makes. The introduction of new production lines requires not only adaptations in the production processes, operating processes and work tasks but also some further qualification of the production employees. The greatest demand for qualification arises primarily in the area of checking and fault finding for electrical and electronic components, which are becoming increasingly important with the advancing development of new makes. In order to ensure continued development of the vehicles and guaranteed quality, internal staff training courses run by trained staff from the parent company are given at BBDC primarily in the event of production changes. In terms of initial mechanic training, however, BBDC does not rely exclusively on standards from the parent company. To this end, co-operations are in place with vocational schools, in which the trainees receive training in special Mercedes classes. What is conveyed here is mainly basic knowledge. However, the training in the manufacturer’s internal classes undergoes no adaptation to new technologies. Specialisation takes place only in the employee’s subsequent place of

work / post, on the one hand through coaching within the framework of the work process and on the other hand through special courses.

By contrast, at Foton Motor – an entirely Chinese company producing lorries and which entered a joint venture with Daimler only in 2010 – there is particular emphasis on general technicians especially being multi-skilled. Nonetheless, there are a few specific specialist departments, e.g. such as the fault finding department, which require special employee know-how. Overall, they are substantially better qualified than the staff in the area of assembly. However, the majority of the better qualified employees can be found more on the higher levels of the company. In general, the company has a very hierarchical nature, which is also manifested in the qualifications of the staff. The introduction of new technologies/makes, such as the “H4” model, has necessitated and continues to necessitate employee education and training, as at BBDC. However, because of the joint venture with Daimler, the company is confronted with new and higher quality standards, which the company is able to meet only with qualified employees. The majority of training required due to structural or production-related change is provided through the hierarchical structure of the company. As such, senior staff are initially trained internally then they pass on their know-how to the employees carrying out the work processes. In order to avoid interrupting the workflow as such and to also give front line employees the opportunity for further qualification, the company offers internal training courses or attendance at a junior college class. However, both of these are provided outside of working hours, which results in relatively low interest in training in the lower levels of employment in the company. In order to nonetheless acquire the necessary know-how in the event of changes, employees are therefore obliged to acquire the necessary know-how through independent learning at home with book materials. In the recruitment of new staff, the company therefore also places greater emphasis on their working morale and work ethic than on a high level of technical competence. New employees can acquire this through practical training and in the context of their practical occupation. In addition to the aim of responding to changes in the company with the appropriate employee qualifications required to ensure the highest possible quality, the company also stands out for a strategy of “reward”. In accordance with the hierarchical structures, particularly outstanding frontline employees are rewarded with the opportunity of a 3-year training course at a university. In turn, the company benefits from the know-how gained there to improve the skills of the trainees. The training within the company is controlled and managed by an internal training department, which responds to changes and controls processes with respect to education and training within the company. This should ensure on the one hand that quality is high and on the other hand that the production does not suffer due to staff shortages as a result of qualifications. The extent to which the company will introduce

changes in the future as a consequence of the joint venture with Daimler cannot yet be assessed – it can only be stated that it must and will respond to the high quality requirements brought by this joint venture. Both case studies clearly show that new qualifications are required due to changes in the production and that the companies, if they want to survive in the market, will be able to maintain their quality in the long term only if they react to changes with modified qualifications.

In conclusion, it may be stated that high quality training of skilled workers will be required in the long term as a result of the rapid development of the automotive industry in China in general and specifically the rapid development of new technologies as well as the quality standards introduced by numerous foreign manufacturers and the demands of customers for greater quality. In order to be able to hold their ground on the Chinese market in the long term and to make high level profits, foreign manufacturers are already transferring to China not only their technical know-how and innovation potential but also their qualification philosophies and strategies. However, these are exclusively geared towards the individual companies and their staff and do not benefit the industry in general. To counter monopolisation by individual groups and companies in the long term and maintain stability on the automotive market through effective competition, skilled workers need to be trained broadly and independently of manufacturers. To this end, it would be necessary to conduct more precise analysis of the present training structures and content with a view to technological changes in automotive development and therefore structures that change the work process in automotive production and the area of service. Such analysis can provide information about existing deficits as well as changes to the current training in the automotive industry that will be required in the future. Primarily, in the light of the Chinese aim to promote the domestic automotive industry in the long term and conquer the global market with Chinese makes/models, the training of well-qualified skilled workers is a “must”. They are the key to the high quality that has to be achieved if China wants to hold its ground with its own makes of car and be able to compete in the international automotive industry alongside well-known manufacturers such as Daimler, VW, BMW, Toyota etc.

Conclusion

The case studies carried out and a document analysis of the development of the motor vehicle industry in China show initial directions of development for the sector. However, there is a lack of framework information on the sector (sector analysis) for comprehensive, future scenarios. Further case studies are also required in this area in order to be able to make specific and reliable statements about changes in vocational training. Despite these gaps in information, however, some examples of development for vocational training in the automotive sector in China are shown below and these could serve as proposals for further research and project activities.

1. The process knowledge of the skilled workers for the optimisation of work processes plays an increasingly important role in the Chinese economy – feedback to production of findings from the quality check at final inspection;
2. Skilled workers need specific knowledge for fault analysis in order to systematise faults – diagnostic competence to limit and localise the fault;
3. Team and group work – Taylorist systems: a decline in the division of labour in the Chinese economy is resulting in strengthening of the vocational training system in China.

Re. 1. The skilled workers in production require ever-greater process knowledge in order to correctly pass on information on how work processes and therefore products can be further improved, so the error rate at final inspection continues to decrease. This targeted information can contribute to the further optimisation of production lines. The development of modern optimisation solutions therefore also demands both profound, detailed knowledge in terms of the work processes, e.g. in final inspection, and good knowledge of individual production lines. The process and system knowledge will be upgraded in significance for future work processes, as there is increasing demand for problem solving and methodological competence across jobs and in relation to the entire business.

Re. 2. For fault analysis, here using the example of the final inspection in production, the skilled workers need specific diagnostic knowledge for the systematisation of the fault. In some cases, skilled workers are guided in fault finding by technical aids (diagnostics devices). However, they often have to analyse the fault independently, using specific procedures (checklists). The knowledge required for this is becoming increasingly complex, as the assembly of the car with electronic components has changed dramatically in recent years.

Re. 3. In both of the case studies examined, a slight decline was identified in the division of labour. Co-operation and arrangement in teams played a role both in final inspection and on the production line. The communication and co-operation processes for feedback of the results from final inspection to the production line were very important. The employee must be seen as an initiator, who is able to responsibly contribute to the optimisation of the work process in consultation with the team. Through this development towards greater independence and co-operation in teams, the value of skilled workers in the companies and therefore also the appeal of vocational training can be increased.

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