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The inevitability of change in Chinese and Indian automakers' low cost productive models

Martin Krzywdinski, Grzegorz Lechowski and Ulrich Jürgens

Introduction

- 1 Low-cost production strategies are reshaping automotive markets in emerging economies. In recent times, both domestic producers and established multinational companies operating in countries like China or India have intensified their efforts to design and produce “good-enough” cars affordable for broader groups of local consumers. These new product strategies are the carmakers' response to a rapidly changing demand structure. While the average incomes in the emerging countries are still well below the developed societies' levels, the formers' domestic middle classes have grown and seen their purchasing power significantly increased during the last two decades (for China and India see: Nag, 2015; Wang, 2015). This has created new market segments for relatively higher-quality, but – by international standards – still rather inexpensive cars.
- 2 In the present paper, we take a closer look at the productive models developed in response to these market and societal changes by indigenous carmakers from two key emerging countries: India and China. As indicated in the literature (Brandt & Thun, 2010), such domestic firms have recently become serious competitors to the established multinationals by offering considerably cheaper vehicles with designs and equipment often comparable to the foreign models. Such productive models could, for instance, focus on minimizing input costs—in particular, the labor costs. Or they can rely on increased share of sourcing from low-cost suppliers. They could also be based on product architectures that simplify the product and, thereby, reduce production costs. And they could, of course, combine several of these cost-reducing measures.

- 3 In our study, we will focus on two companies: Geely from China and Mahindra & Mahindra (hereinafter M&M) from India. Both carmakers, within the last decade, have not only managed to attain relatively strong positions in their domestic markets, but have also intensified their attempts to expand internationally.
- 4 Regarding our theoretical perspective, the following analysis builds on the notion of “productive models” proposed by Boyer and Freyssenet (2002). Using this concept, we will attempt to reconstruct the two carmakers’ low-cost productive models by focusing on their three major aspects: (1) *product policies*, including the quality, range, and architecture of the products offered by the two companies; (2) *productive organization*, referring to the firm-internal organization of production as well as supplier relations and external service provision; and (3) *labor relations*, defined as the firms’ HRM and employee voice policies. In addition, drawing on Boyer and Freyssenet (2002), we will consider the viability of the two studied productive models within their broader societal contexts regarding possible conflicts between the firms’ main stakeholders.
- 5 In our study, we develop three major arguments. First, we show that successful low-cost productive models represent specific configuration of labor relations, productive organization and product policies. This implies that simply focusing on low labor cost is not yet a viable approach. We further argue that the development of such low-cost productive models requires specific societal conditions regarding the demand structure and also the local industrial base. Developing relevant and sustainable low-cost productive models is not an easy task for the indigenous producers from emerging economies. This has been shown, for instance, by the spectacular fiasco of the Tata Nano project—the surprisingly unpopular Indian “people’s car” (Nielsen & Wilhite, 2015; Nieuwenhuis & Wells, 2015).
- 6 Second, we emphasize that low-cost productive models are characterized by specific contradictions which drive companies towards an upgrading. The companies studied in this paper view low-cost approaches as a transitional phase in the “fight for the middle” (Brandt & Thun, 2010), which describes the growing competitive tensions between the domestic and the multinational producers operating in the developing markets. Given the lack of own product development, the domestic producers often have to rely on Western engineering firms and suppliers, what makes it difficult to maintain a low-cost approach. At the same time, we expect that the domestic companies from emerging economies, while upgrading, will attempt to retain their cost advantages over the multinationals, for instance by preserving their labor regimes or cheap local supply chains. This can, however, easily result in a deadlock, especially if investments in new knowledge and skills are neglected.
- 7 Our study uses the empirical material presented in Jürgens and Krzywdzinski (2013, 2016) and seeks to exploratively reevaluate this research in light of the question about the development of low-cost productive models in emerging markets. The original data—consisting mainly of interviews with HR and production managers at the plants operated by indigenous producers, local trade unionists, and car industry experts specializing in emerging economies—was collected by Ulrich Jürgens and Martin Krzywdzinski within the research project “Personnel and Production Systems in the BRIC Countries” (for a more detailed description of the methods and data, see Jürgens & Krzywdzinski, 2016, p. 19f). In the analysis presented here, we also used additional secondary sources, such as company annual reports, trade press articles, or existing research literature.

- 8 The remainder of the paper is structured as follows. In the second section, based on the existing literature, we outline the external-societal conditions of the low-cost productive models designed for emerging countries. The third section continues the literature review by comparing the research findings regarding low-cost practices of the established multinationals and the domestic producers from emerging economies. The fourth section presents our analysis of the Geely case, whereas the fifth discusses the case of M&M. In the final part of the article, we propose some general conclusions regarding the trajectories of low-cost productive models in emerging economies.

Societal conditions of low-cost concepts in emerging countries

- 9 In order to understand how low-cost productive models develop and are implemented in emerging economies, we need to take into account various institutional and market contexts in which they are embedded. Leaving some “degrees of freedom”, such contextual conditions largely determine the range of viable and sustainable approaches.
- 10 First, emerging economies like China and India can still be characterized as low-wage locations. In such societal contexts, manufacturers are able to minimize their labor costs by exploiting the abundance of cheap and highly motivated labor (see e.g. D’Costa, 2011; Noble, 2013). In addition, governments in both countries are willing to protect their emerging industries and thus tolerate the extensive use of temporary work, low wages, and sometimes even violations of existing employment laws (Barnes, Das, & Pratap, 2016; Ngai & Chan, 2012). This clears the path for low-cost strategies. But on the other hand, radical “low-road” approaches to employment already provoke resistance of the local workers – as has recently been observed in the case of both the Chinese and the Indian automotive sectors (Barnes, 2017; Lüthje, 2014).
- 11 Second, the demand structure is changing in both China and India. Middle-class populations have grown significantly during the last two decades, and so have their average incomes (Nag, 2015; Wang, 2015). And as a result, the domestic markets for durable goods, such as passenger cars, have expanded beyond the urban, managerial, and political elites. But on the other hand, the purchasing power levels of these emerging middle classes are still far below the levels typically found in highly developed countries. This implies that members of these groups will usually not buy the expensive, high-quality products originating from mature markets.
- 12 This recent transformation of demand has affected the local market positions of established foreign carmakers and has opened a window of opportunity for domestic manufacturers. In the decades following their entry into emerging markets, multinationals from Europe, the USA, and Japan adopted product strategies in India and China that were organized around the “exportability” of the cars, which were designed originally for mature markets (Jullien & Pardi, 2013). In the past, foreign companies in most cases simply remarketed their outdated models and avoided any product development targeted specifically at Indian or Chinese customers. An even less detached strategy was to license off their outdated car models to local producers in the developing countries. Later, the multinationals did indeed decide to introduce various relatively modern vehicles—like the VW Passat, launched in China in the year 2000 (Thun, 2006); these, however, were still designed primarily for developed countries and could only be

afforded by a small share of customers in emerging economies. The new demand structure, which meant that broader middle-class groups aspired to car ownership, presented the multinationals with a serious challenge. If they wanted to capture a part of the rapidly growing market for affordable cars, they had to develop designs dedicated to needs of the emerging markets.

- 13 And third, the transformation in the demand has been accompanied by a maturing of the local industrial base. Both China and India have tried to stimulate the development of local productive capabilities. Since the early 2000s, the Indian government has, on the one hand, allowed fully foreign-owned subsidiaries in the automotive sector, but, on the other, upheld very high tariffs for imported vehicles—with the overall duty exceeding 100% of the car value (Tiwari & Herstatt, 2014). In China, the central government has set the tariff barriers at a moderately high level of 25% (with additional duties on imports from selected countries) and, at the same time, maintained the 50-percent foreign ownership limit for investments by multinational OEMs (Noble, 2013). The sustained high tariff and nontariff barriers put the multinational companies under pressure to establish local production facilities. As a result, a relatively well-developed manufacturing base emerged, which created a “latecomer advantage” (D’Costa, 2016) for the indigenous producers.

Varieties of low-cost productive models

- 14 Our analysis assumes that the multinational and the emerging economies carmakers face different opportunities and obstacles to develop relevant low-cost productive models in the emerging markets. This is related, in the first place, to the different industrial capabilities and organizational routines accumulated by these companies. We will refer to the efforts of the multinational producers to decrease their usual production costs and make their cars more price-competitive as the “*top-down*” low-cost model. In contrast, the attempts of the indigenous firms to secure a large share in the changing local car markets by upgrading their productive capabilities will be labeled the “*bottom-up*” model.

The “*top-down*” approach

- 15 The traditional low-cost approaches used by multinational carmakers in developing countries relied on the production of older cars (or the licensing of their production to local firms) that were no longer being sold in the mature markets. Production equipment (along with many car parts) was often shipped from the sites in the mature markets to developing economies. The economic logic behind this model was that the development and production-equipment costs had already been amortized. A prime example of this strategy is the Santana model, which was manufactured by Volkswagen in China. Whereas production of the Santana ceased in 1988 in the original European market, the model was manufactured in China for another 25 years (1985–2013), with only minor technological and stylistic improvements (Chin, 2010). A more recent example of such a strategy seems to be General Motor’s Baojun brand, designed primarily for the Chinese market. The company’s initial car (Baojun 630), was based on older GM models (Nam, 2015). And importantly, the company’s production facility was located not in one of China’s highly industrialized coastal areas – usually chosen by multinational carmakers (Lüthje & Tian, 2015) – but in Guanxi, a less developed and low-wage region within China.

- 16 Due to the transformation of emerging economies described above, the last two decades have seen the emergence of new low-cost approaches. In recent years, some Western multinational carmakers have tried to introduce low-cost concepts designed especially – or at least primarily – for emerging markets. Willing to diversify their local product offerings beyond the top and middle segments of the market, the multinationals decided to launch either wholly dedicated “no-frills” brands or single low-cost models.
- 17 One particularly successful example of this approach is Renault’s Dacia. The brand’s first car model, the Logan, was a huge marketing success in many emerging countries (e.g. Russia); and, it was introduced also to several mature markets. It was a remarkable phenomenon given the failure of many other products developed by Triade manufacturers for the emerging economies (Dunford, 2009). Renault’s particular capabilities in developing dedicated low-cost models were underlined by the huge success of the Kwid, the company’s low cost car for India (Midler et al., 2017).
- 18 Existing empirical analyses of Dacia’s productive model point to various elements that contributed to the company’s success as a producer of affordable “good-enough” cars.
1. Product architecture: According to Jullien et al. (2013), the Dacia approach to product architecture departed from the established Renault practices by prioritizing simplification. Achieving the final-price target of 5,000 euros per car required a disciplined “design-to-cost” approach. In this respect, Dacia went a step further than the Toyota model, which traditionally emphasized architectural standardization in order to limit technological or marketing risks (Boyer & Freyssenet, 2000). In addition, the success of Dacia’s productive model is also grounded in the parent company’s industrial capabilities. This is indicated by the fact that Logan designers have reused parts and components from various pre-existing car models by Renault or Nissan – and in this way, were able to bring down Logan’s development costs.
 2. Process organization: The organization of production at Dacia’s factory is based on a low-investment approach and focuses largely on manual work.
 3. Supply chain: Very important for the Dacia’s success were Renault’s customary suppliers. The company decided to outsource an unusually large part of activities (Jullien et al., 2013). And being unable to identify a sufficient number of reliable local producers in Romania, the management decided to involve in the project Renault’s suppliers, like Faurecia or Valeo, urging them to locate production facilities in Romania.
 4. And finally, it was observed that the company follows a “low-road” approach to employment. For instance, workers’ wages are kept very low – at about 30% of Renault’s average pay levels in Turkey, and at about 10% of what the company’s Spanish workers earn (Jullien et al., 2013). Unsurprisingly, this “low-road” strategy has led to conflicts between the management and the local workers (Adascalitei & Guga, 2016).
- 19 Other multinationals have been far less successful in developing emerging-market product strategies. One example is the VW Gol produced by the German multinational in Brazil and marketed in various Latin American countries. The Gol was developed at the VW’s local facilities by integrating components from VW’s other models, the Golf and the Polo, into a new, simplified product architecture. The use of the parent company’s pre-existing designs, components as well as production equipment allowed a significant reduction of production and development costs. In difference to the Renault case, however, the Gol was born from local initiative and never fully enjoyed support from the company’s headquarters. VW never developed a successful systematic low-cost strategy for emerging economies. Due to lack of follow-up investments, the Gol started losing market shares in Brazil. VW’s failure in the low-cost segment despite several attempts in

joint ventures with firms like Suzuki or Tata illustrates the challenges of the “top-down” approach.

The “bottom-up” approach

- 20 The “bottom-up” approach characterizes strategies of domestic manufacturers from emerging economies. One particularly radical approach was evident in the case of the Tata Nano. The Nano was marketed as “the world’s cheapest car” with a final-price goal of approximately 1,400 euros. This was based on a radical simplification of the product architecture, the low wage cost in Tata’s Indian operations, and very limited investment in new product development. The engine and all major components were purchased from multinational suppliers (Schuster & Holtbrügge, 2011).
- 21 In contrast, various Chinese manufacturers have pursued a different approach. Of course, the first element of their productive models is the specific labor relations based on the use of low-wage work, high shares of precarious employment, and the lack of a labor interest representation. Extant literature emphasizes, however, a second element which is a radical shift in the product architecture, from a closed design (be it integral or modular) to an open modular design (Fujimoto, 2002, 2007). A closed design means that a single lead firm controls all the interface specifications between parts and components; this grants it a position at the top of a hierarchical supplier network. If the interfaces between parts are mainly product specific, the design can be called closed integral. If there are standardized interfaces across different products of the firm, the design can be called closed modular. *Open* modular product design, by contrast, means that the standardization of interfaces between parts and components is defined at the industry level.
- 22 According to Wang (2008, 2009) and Fujimoto (2002), the open (or quasi-open) modular product architecture was developed by domestic Chinese manufacturers as a response to the huge technology gap between them and companies from Triade countries. It built on the relatively low levels of intellectual property protection in China, which allowed domestic companies to reverse-engineer foreign car models. Parts and components were purchased from foreign companies’ original suppliers or from Chinese suppliers that copied the original design. In order to avoid intellectual property rights conflicts, Chinese companies tried to slightly modify the cars, often by integrating parts and components from other manufacturers’ car models. Wang (2008) uses the notion of the (quasi) open product architecture to describe this copying and recombination strategy. The term *quasi* indicates that this approach was born from improvisation and did not rely on formal inter-company standardization processes. This approach facilitated a much higher involvement of Chinese low-cost suppliers than was and is practiced by foreign companies in China (Brandt & Thun, 2010, p. 1562). As Holweg, Luo, and Oliver (2009) argue, domestic Chinese suppliers still lag far behind foreign companies regarding productivity and quality, but they draw their advantages from very low labor cost. The vehicles developed in this way could be offered on the market for prices between 5,000 and 10,000 euros, and they were often very similar to their foreign equivalents without achieving the same levels of quality and performance.
- 23 We can summarize this literature review in three points. First, the low-cost approaches of car manufacturers from emerging economies build on major societal transformations: the rise of new middle classes in the emerging economies and their increasing demand for

cars, the possibilities for companies to rely on low wage work, and the strong industrial base of suppliers and service providers which has been created by multinational companies operating in the emerging economies. Second, the existing low-cost strategies rely on a combination of new simplified product architectures, low-cost production organization, and low wages. It does not seem sustainable to build a low-cost strategy on low wages only. Third, the low-cost strategies differ according to the type of the company and the institutional context.

The case of Geely

- 24 Geely was founded in 1986 and today has three divisions: automotive, educational, and hospitality. The automotive division employed 18,000 persons in 2016. Geely is the only completely private Chinese automotive company—an exception in an automotive sector dominated by traditional, state-owned companies. It is seen as the prime example of a successful low-cost domestic Chinese producer. Yet, based on the Geely case study presented in Jürgens and Krzywdzinski (2016) and on insights from other existing studies (e.g. Balcet, Wang, & Richet, 2012; Wang, 2008) we argue that the company's trajectory shows serious limitations of the "low-cost" approach.

Product policy

- 25 Geely started as an automotive manufacturer by producing and selling a copy version of the FAW Xiali, which was already a copy of the Japanese Daihatsu Charade (Wang, 2008). This was followed by further car models that imitated foreign automobiles. All those cars were sold at much cheaper prices than those of Geely's foreign competitors.
- 26 This strategy relied on reverse engineering and a (quasi) open product architecture (Wang, 2008), which, according to Wang and Kimble (2013) Geely is utilizing up until today. For instance, Geely's cars are designed to be compatible with engines from different producers. Other car modules are also designed to be able to use parts from different sources and thus reduce costs.
- 27 We argue, however, that this approach is only a transition phase for Geely, which it is deploying while the company builds up its own product development capabilities and seeks to offer more sophisticated car models. The creation of the Emgrand brand was the first step in this direction: Emgrand was meant to be positioned above the Geely brand regarding price and quality. Nevertheless, the Emgrand cars have remained based on a (quasi) open architecture: Many components look like imitations of Japanese products, in particular of the Toyota Camry.
- 28 This approach, however, did not lend itself to producing cars with a quality and performance similar to those made by Geely's Japanese, European, or American competitors. Geely therefore turned to an acquisition strategy in order to grow out of the low-cost market segment (Balcet et al. 2012). In 2006, the company set a target of achieving "technology leadership," which implies developing its own product development capabilities (Balcet et al., 2012, p. 372). In 2009, Geely acquired the Australian transmission producer Drive-Train Systems International (DSI). An important step towards upgrading was the acquisition of the Swedish automobile manufacturer

Volvo in 2010, which was intended to facilitate a systematic technology transfer to China (Alvstam & Ivarsson, 2014; Balcet, 2014; Balcet et al., 2012).

Productive organization

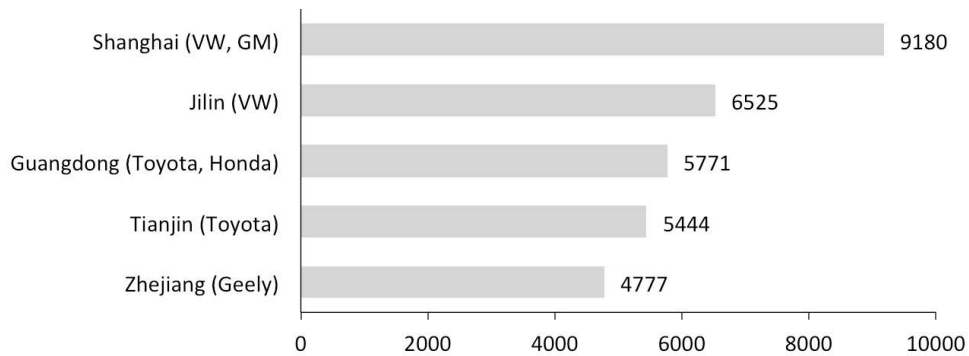
- 29 As Wang (2008) describes, Geely started with very low degree of vertical integration. Engines and transmissions were bought from other companies, in particular from Toyota and its suppliers. When Toyota increased the prices for its engines, Geely invested in building up its own R&D unit, which developed its own engine based on Toyota's products through reverse engineering. With the acquisition of DSI, Geely also started producing transmission systems in house.
- 30 Given that the major condition for offering low-cost cars is to purchase low-cost parts and components, the dominant criterion for supplier selection at Geely is price (Wang, 2008, p. 525). Around half of Geely's suppliers are small and medium sized Chinese companies providing simple low cost parts – a much larger share than in the case of foreign car manufacturers in China. Even Geely, however, has to rely on larger suppliers producing also for foreign automotive manufacturers for other parts and components.
- 31 In the following, we will describe Geely's own production organization, taking the example of the Ningbo plant (see Jürgens & Krzywdzinski, 2016). The plant exhibits clear characteristics of lean production such as standardized work, Kanban systems, Andon systems etc. Geely managers visited Toyota plants in order to learn about Toyota production system.
- 32 The automation level of the Ningbo plant is low. In the body shop, about 25% of the tasks were automated at the time of our study, which is considerably below the levels of automotive plants in Europe or Japan. Most of the welding was still done manually. In the assembly shop, only windshield installation was automated. Automation however is not at the focus of lean production systems anyway, and Geely seemed to set out for a full scale implementation of the system at the time of our research. This implied using the line-stop system which had been installed which meant an empowerment of the rank and file workers at least to a certain degree.

Labor relations

- 33 The employment relations partially conformed to the expected low-cost approach. The Ningbo plant recruits workers from vocational high schools in rural areas in Shandong and other provinces, who then move to live in Geely's own dormitories. In a city like Ningbo they usually receive the hukou (the registration which gives them access to the social services of the city like schools, health care, kindergartens etc.; see Cheng & Selden 1994) if they have an employment contract and an apartment. The provision of dormitories is hence an important precondition for receiving the hukou. Research literature emphasizes, however, also the role of dormitories in China as part of a paternalistic workplace regime (Ngai & Smith, 2007), but we could not examine this argument in the case of Geely in more detail. The workers receive two successive fixed-term contracts, which sum up to ten years in total. Temporary agency workers are used as a flexibility buffer when demand fluctuates. In 2010, agency workers represented 8% of the Ningbo plant employees.

- 34 Recruiting workers from poor rural areas and providing accommodation in dormitories are the foundations for a low wage level. The entry-level wage for workers is 10% above the minimum wage in the province. As Figure 1 shows, the average wage in the Zhejiang automotive industry (Geely is the main automotive manufacturer in Zhejiang) lies at around 50% of the wage level in the Shanghai automotive industry, where Volkswagen and General Motors are located, and at around 80% of the wage level in Guangdong, one of the main locations of the Japanese car manufacturers in China.

Figure 1: Monthly average wages (CNY) in the automobile industry in selected regions, 2014



Source: authors, based on NBS (2014, p. 173). In 2014, 1,000 Chinese Yuan corresponded to about 133 Euros.

- 35 The trade union at Geely limits itself to the traditional tasks of organizing social and cultural activities for workers, supporting workers in the event of sickness, family-related problems, and difficult personal situations, and promoting collective spirit and dedication to work. There is no collective bargaining, and consequently, there is no pressure to increase wages as long as the supply of workers from rural areas does not end.
- 36 The low wage level certainly is one of the main reasons for the high labor turnover in the Ningbo plant. In the years after the plant's founding, labor turnover reached around 40% per year. This is a problem for the company, which invests considerable resources in skill formation. Production workers are recruited from secondary vocational schools. All workers start with a ten-day introductory training; this introduction is followed by a week of fundamental skills training, which is an introduction to the principles of standardized work and in the basic tasks in their future production area. After this, the workers complete on-the-job training. Geely has designed a special process for the on-the-job training. Each new worker is assigned a mentor and there is a "contract" between worker and mentor, which makes the mentor responsible for successful training (see also Jürgens & Krzywdzinski 2015).
- 37 Skilled workers employed in maintenance and other indirect areas are recruited from Geely's own vocational colleges. The company has established its own education division, which runs the Beijing Geely University, the Geely Sanya College at Hainan University, the Zhejiang Automotive Vocational College, and the Zhejiang Institute of Automotive Engineering. Some educational programs at these institutions are explicitly modeled on German vocational education concepts. In 2010, Geely received the "Model Enterprise of Vocational Education of the Chinese Automotive Industry" award.
- 38 The case of Geely shows the potential but also the limits of a low-cost approach. Based on a (quasi) open product architecture, high reliance on low cost suppliers, and a low-cost

model of employment relationships, Geely has succeeded in winning market share and establishing itself as a competitive automotive manufacturer. Further growth—particularly in the more profitable middle and upper segments of the automotive market—will require the company to build up own product development capabilities. Geely is trying to achieve this by making acquisitions and creating its own R&D units and training institutes. The decreasing reliance on reverse engineering implies a shift towards closed product architectures and requires the company to invest in skill formation, not only in its engineering departments, but also in production. Low wages and high labor turnover seem inappropriate given these aims and we might expect the company to modify its wage policy in the long term.

The case of Mahindra & Mahindra

- 39 Established in 1945 as a steel trading company, today M&M is one of India's largest family-owned conglomerates, with around 200,000 employees and multiple operations worldwide. Apart from passenger cars, the firm's automotive division also produces tractors, two-wheelers, heavy equipment, and parts. Since the early 2000s, M&M has experienced a period of rapid growth and has made various acquisitions. In 2011, it acquired SsangYong, a Korean SUV manufacturer. One year earlier, it decided to enter the electric vehicle market by taking over the Indian firm Reva.

Product policy

- 40 M&M has a long tradition as an automotive producer. It entered the automotive business in 1947 as an assembler of jeeps for the Indian market under license from Willys. More recently, M&M made its first attempts to enter passenger car production. In the 1990s and 2000s, it was a contract manufacturer for Ford (Ford Escort) and Renault (Logan) and accumulated some initial experience in passenger car production (see Jürgens & Krzywdzinski, 2013, p. 120). However, due to weak sales of the assembled models, the cooperation ended only a few years after its launch.
- 41 In the early 2000s, M&M started producing the Scorpio, its first “urban” SUV targeted at domestic middle-class consumers—a product based on the company's expertise with jeeps and other utility vehicles. The product strategy was a different to that of Geely. While Geely initially concentrated on small cars, M&M has established itself in the sub-segment of SUVs, by positioning its cars as cheap and “good-enough” alternatives to the models offered by Western and Japanese MNCs. Currently, the company offers a diverse range of vehicles in this segment. Here, the low-cost strategy does not mean focusing on the “cheapest” market segment, but rather competing with foreign manufacturers in more demanding segments by offering products that are more price-competitive. A good example here is the XUV500, launched by the company in 2011, with a starting price of about 18,000 US dollars (around half of the price of a foreign SUV). While this strategy worked relatively well in India, the company's hopes to export its cars (Karmali, 2011) were largely disappointed.
- 42 Regarding product development, M&M's strategy exhibits both similarities and differences to the strategy employed by Geely. First of all, like Geely, M&M had to overcome the problem of its insufficient product development capabilities. Whereas Geely dealt with the issue through reverse engineering, this approach was not possible in

India given its stricter intellectual property regulation. M&M thus decided to delegate the more demanding engineering tasks to suppliers and specialized engineering companies. Its own development team comprised a mere 120 engineers, who were responsible for the general exterior design and module specification. The majority of the key components (engine, transmission, but also the interior) used in the Scorpio were developed externally (Wielgat, 2002). Since M&M pressured the suppliers to reduce development and tooling costs, many components were not designed specifically for the new model, but were based on existing designs (Wielgat, 2002). The literature refers to this latter strategy as M&M's "capability to recombine"—including a possible reutilization of the existing components in the company's other models (Sharmelly & Ray, 2016).

- 43 Similar to Geely, however, M&M has continuously upgraded its in-house development capabilities. For instance, the engines used in the early versions of its SUVs were simply purchased from multinational companies like Peugeot or Renault. A few years later, the company assigned the engineering consultant AVL to design a series of new diesel engines. Given that engineering services are not cheap, M&M set up its own engine development center in Chennai in 2012—as part of the larger "Mahindra Research Valley"—where it now plans to independently build a new engine family (Auto Tech Review, 2012).

Productive organization

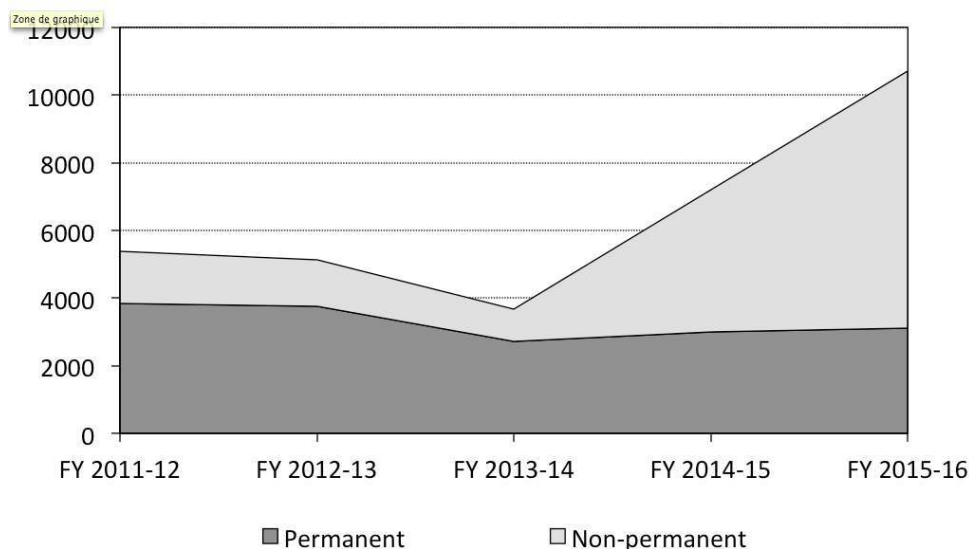
- 44 As mentioned above, the company delegates a large part of component development to suppliers. Producers from developing or newly industrialized countries play an important role in the supply network. For instance, in the case of the Scorpio, M&M decided to delegate the suspension development and production to a Korean component manufacturer that had no prior experience with suspension systems; this manufacturer hired Japanese experts for this project. The majority of parts are supplied by plants in India or Asia, a practice that makes the low-cost approach feasible.
- 45 Let us take a closer look at the organization of production at M&M's own factories by focusing on the Chakan plant, officially inaugurated in 2010 (see also Jürgens & Krzywdzinski, 2016). The facility is a part of the Chakan Special Economic Zone, situated in close proximity to the city of Pune. The Chakan plant began operations with the production of a mini truck and larger commercial vehicles, and later, in 2011, became the main plant responsible for production of the urban-market oriented XUV500. Between 2011 and 2016, the factory manufactured on average about 120,000 vehicles annually (Mahindra & Mahindra, 2014, 2016).
- 46 As Jürgens and Krzywdzinski (2013) emphasize, M&M used its joint ventures with Ford and Renault as well as visiting programs for executives at Toyota in Japan to develop expertise in lean manufacturing—the Chakan plant shows the clear influence of these concepts (e.g., emphasis on teamwork and employee involvement in problem solving, standardized work, installation of a line-stop system). But at the same time, there seems to be an even stronger focus on low-cost solutions here than in the case of Geely. The level of automation remains very low—in the body shop it was at only 12%, which is not only far below the European standards, but also less than in typical Chinese automotive plants. In a press interview (AMS, 2010), a senior manager at M&M commented on the company's approach to the Chakan plant's design, and in particular regarding automation at the body shop, as follows: "We looked into 'frugal' manufacturing and have achieved a

judicious balance of men, equipment and automation [...] There is a very healthy mix of manual and robotic welding in the body shop. This gives us flexibility and a lower investment cost”.

Labor relations

- 47 At first glance, the employment relations at M&M appear to be organized around the idea of minimizing labor costs by taking advantage of local labor market conditions. The factory recruits very young workers (maximum age 27), and predominantly from rural area, which can be seen as a strategy to achieve a high level of workforce motivation at relatively low wages. The management sees it as an element of the company's corporate social responsibility policy to include disadvantaged social groups in its workforce (Scheduled Castes, Scheduled Tribes, Other Backward Classes; see Jürgens & Krzywdzinski, 2016, pp. 102, 107). If all goes well the policy can serve to build up a loyal workforce. We find an interesting twist here where regarding the use of a low cost strategy as part of a CSR policy.
- 48 The fact that the plant is localized in a Special Economic Zone, which gives the company additional flexibility regarding the scheduling of working times and overtime work (see e.g. Parwez, 2015). A clear indication of a low-cost approach to labor at the Chakan plant (or more precisely, at Mahindra Vehicle Manufacturing Ltd.) is the use of temporary employment (Figure 2). In 2015-16, the plant employed around 3,000 permanent employees and around 7,000 people on temporary contracts (mainly agency workers and other contractors) (Mahindra & Mahindra, 2015). There are several potential explanations for this extraordinarily high share of temporary employment and it is not clear if it will remain stable in the future. First, it might be a deliberate strategy aiming at exploiting low wage cost. Such strategies are common in the Indian automotive sector (Barnes, Lal Das, & Pratap, 2015; Jürgens & Krzywdzinski, 2016, p. 99). Second, it could be a temporary phenomenon due to rising production levels, which will result in an increasing number of permanent employees if production stabilizes at a high level. Third, it could be a statistical effect of organizational restructuring e.g., if activities relying mainly on temporary work (logistics, pre-assembly of certain components etc.) were now included in the reporting. Given that this increase in temporary employment occurred after our interviews in the Chakan plant, we cannot identify the main reason here.

Figure 2: Employment structure at Mahindra Vehicle Manufacturers Ltd., 2011-2016



- 49 The reliance on the extensive use of temporary labor seems compatible with M&M's approach to skill formation for production workers. The recruitment requirements for production workers are low: the company does not necessarily expect recruits to have completed secondary school. There is an onboarding program of three weeks including a basic introduction into automotive manufacturing, and a one-week training program in fundamental skills in a special shop-floor facility. Regarding skilled workers for maintenance and other functions requiring higher qualifications or experience, relies on hiring experienced skilled workers from the external labor market or directly from Industrial Training Institutes (ITIs) or polytechnics (Jürgens & Krzywdzinski, 2016, p. 103). The company collaborates with two ITIs in the Pune region and takes their students as interns. However, in India it is common practice to deploy such interns as cheap labor on the line—it is unclear whether this is also the case at M&M. At the time of our study, the company lacked an own structured vocational educational program.
- 50 While M&M does not perceive a high level of technical skills as a necessary requirement for production workers, the employee development practices at M&M point in the direction of a high investment orientation towards skills. The company has an ambitious system of employee development based on long-term Work Life Plans (Jürgens & Krzywdzinski, 2016, p. 165f). It provides scholarships for workers who are willing to study. These measures are meant to develop the “high potentials” and future supervisors on the shop floor, since tertiary-level qualifications are a prerequisite for supervisory positions.
- 51 Industrial relations in the Chakan plant are complicated. The company initially tried to prevent the establishment of a union; instead, it invested in various forms of direct communication with the employees, like monthly departmental meetings or employee surveys (Jürgens & Krzywdzinski, 2016, p. 295f). Eventually, however, an internal union was indeed established in the factory; but its position—as became apparent on the occasion of wage disputes at the plant in 2014—was not uncontested among the workforce (The Indian Express, 2014). Ongoing tensions between management and labor over wages and employment conditions, expressed in the form of various collective

actions, have been observed at M&M's domestic plants throughout the last several years (see e.g. Galib, Munny, & Lin, 2011; ITUC, 2013).

- 52 M&M pursues a specific low-cost approach: it does not aim to produce cheap, simple cars, but rather to offer SUVs at a much lower price than its established competitors from Europe, the USA, or Japan. Given that it lacks its own product development capabilities, the first pillar of M&M's productive model was its reliance on engineering service firms for all major product development tasks—which was not cheap. The company's price competitiveness was built on the cooperation with Asian low-cost suppliers and a low-cost approach to labor in its own Indian factories. This strategy worked well on the Indian market—at least until the recent slowdown in the whole Indian automotive industry; but M&M has, as yet, not been able to achieve success in more developed export markets, where consumer quality expectations are higher. The company's productive model is far from stable. On the one hand, the company has tried to create its own product development capabilities and to reduce its reliance on external engineering firms. On the other hand, although the management has made significant efforts to retain its skilled workforce, the company's employees are contesting their low wages and precarious employment and could challenge this element of the low-cost strategy.

Conclusions

- 53 We started from the insight that three major transformations in emerging economies have radically changed the conditions for the development of domestic car manufacturers. First, increasing incomes of middle classes have changed the demand structure of automotive markets and created a window of opportunity for new entrants in the industry. Second, the wages of workers remain relatively low and allow companies to pursue low-cost strategies. Third, car manufacturers from emerging economies benefit from the relatively strong industrial base of suppliers and service providers which has been created by foreign multinationals.
- 54 We examined two cases of low-cost automotive manufacturers from China and India. The manufacturers from emerging economies have entered the new competition with significant disadvantages compared to companies from the Triade: They lack established brand names, technologies, and product development capabilities, and they do not have the same economies of scale. Their productive models combine several elements allowing them to offer products much more cheaply than the incumbents. In both cases, the companies have used (quasi) open product architectures in order to expand low-cost sourcing from domestic suppliers in emerging economies and to allow the use of parts designed for other car models. Geely tried to overcome its lack of product development experience via reverse engineering (which was possible due to the loose intellectual property rights regime in China) while M&M almost entirely outsourced development to engineering firms and suppliers. Both companies have also built their price competitiveness on low wages and the extensive use of temporary employment.
- 55 Our analysis shows, however, that neither company aims to specialize in low-cost models. Their approaches rather can be understood as a first step in the “fight for the middle” (Brandt & Thun, 2010) i.e., for the middle segments of the automotive markets. Geely started out as a producer of small, cheap cars, but is increasingly moving into more sophisticated market segments. M&M has focused on the SUV market from the start.

- 56 We argue that one of the drivers of this upgrading is the lack of long-term sustainability of low-cost approaches. Both Geely and M&M are trying to build up their own product development capabilities in order to overcome the limits of reverse engineering (Geely) and the high cost and dependencies of the cooperation with engineering service firms (M&M).
- 57 A particularly important fact is that both firms are confronted with contradictions in their labor relations. In order to improve quality and productivity, they are investing in skill formation. The firms' orientation on lean production concepts contributes to moving away from low-cost strategies. It requires training regarding quality control systems, continuous improvement activities, and the functioning of the production systems in general. This contradicts the low-wage policy, which has created high labor turnover (Geely) or labor disputes (M&M). Labor relations are perhaps the most serious threat to the stability of both productive models. It might be that these contradictions will drive both companies to abandon the low-cost approach.
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ABSTRACTS

In emerging economies, social change and fast growth have created new automotive markets and a demand for relatively inexpensive, "modern-enough" cars. Up-and-coming local manufacturers and established companies from the Triad countries are competing for dominance in these vast market segments. The paper examines the productive models developed in this context by two indigenous carmakers, one from China (Geely) and the other from India (Mahindra & Mahindra). A variety of tensions are revealed within the two models, relating in particular to labour policies. Both models seek to combine low wages and a reliance on low-cost supply chains with simplified product architectures. Their stability is fragile, however, with one solution involving employee upskilling to increase productive system efficiency.

En las economías emergentes, el cambio social y el rápido crecimiento han dado origen a nuevos mercados de automóviles, y a una demanda de automóviles relativamente poco caros y bastante modernos. Los fabricantes locales y las empresas extranjeras están en competencia para dominar esos vastos segmentos del mercado. El artículo se enfoca en los modelos productivos desarrollados en este contexto por dos fabricantes de automóviles nativos, uno de China y otro de India. El análisis revela diversas tensiones en el seno de estos modelos, en particular en torno a las políticas de mano de obra. Los dos modelos buscan combinar salarios bajos y cadena de suministro a bajos costos, con arquitecturas de producto simplificadas. Sin embargo, su estabilidad es muy relativa; una de las soluciones pasa por la cualificación de los asalariados para mejorar la eficacia de los sistemas productivos.

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