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Skill formation, automation and governance: comparing German and Korean automotive manufacturers in Central-Eastern Europe

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Skill formation, automation and governance: comparing German and Korean automotive manufacturers in Central-Eastern Europe

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Abstract

Purpose – Building on neo-institutionalism models of the transfer of human resource management (HRM) practices within multinational companies, this paper aims to analyze the transfer of skill formation concepts using the cases of two automotive OEMs in Slovakia. The purpose of the paper is twofold. First, it aims to explain the differences between the two multinationals. Second, it builds on the empirical analysis to reconsider the neo-institutionalist theoretical framework.

Design/methodology/approach – The paper is based on two qualitative case studies of automotive multinationals in Slovakia. The home country locations of both companies represent different approaches to skill formation: systematic vocational education for blue-collar workers is regarded as crucial at the German manufacturer, while the Korean company relies mainly on on-the-job-training and puts much less emphasis on skilled blue-collar work.

Findings – The paper shows that the differences between the companies are related to different understandings of technology/automation. It argues that the increasing automation and the decentralization of responsibilities for the product-launch processes supported the transfer of German skill formation concepts to the plant in Slovakia, while the Korean manufacturer's specific engineering-led automation concept and centralization of product launch responsibilities in its Korean headquarters reduced the need to invest in skill formation for blue collars abroad. The paper concludes that theories of the transfer of HRM practices within multinationals must include technological factors and must also develop more specific concepts of the centralization of multinationals.

Originality/value – The paper is to the knowledge the first to include technology as a core variable into the neo-institutionalist theory in the field of international business and HRM. While the relationship between technology and organization has gained huge prominence in the recent discussions about digitalization, it has been so far neglected by scholars of international business.

Keywords Technology, Multinational companies, Centralization, Automotive industry, Skill formation

Paper type research paper

1. Introduction

The skill-formation practices of multinational company (MNC) subsidiaries have often been studied within a (neo) institutionalist framework (Kostova *et al.*, 2008). The major argument here has been that multinationals operate in diverse organizational fields. Therefore, any analysis of multinationals' skill-formation should link the macro level of institutional differences between the company's home and host countries, the meso level of headquarters-subsidiary relations within the multinational companies and the micro-level of politics and

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institutional entrepreneurship among managerial actors (Fortwengel and Jackson, 2016; Jürgens and Krzywdzinski, 2016). In this paper, we build on the institutionalist literature but propose two extensions to the existing theoretical framework. First, we argue that we have to introduce technology as an important factor influencing the skill-formation practices of MNC subsidiaries. Second, we argue that we have to specify how centralized power and competences are within multinational companies to a greater extent than has occurred in the dominant approaches (Bartlett and Ghoshal, 1989; Kostova *et al.*, 2018). To understand skill-formation, we will particularly focus on the division of labor between the headquarters and the production plants in the ramp-up process for new products. The inclusion of these two points represents the innovative contribution of this paper to the research debate.

Our focus is on skill formation in the blue-collar area. We develop our theoretical model using the cases of a German and a Korean automotive OEM in Slovakia. Both companies are leading global automobile MNCs with a strong presence in emerging economies. Both have been producing in Central Eastern Europe (CEE) for a long time. Their factories in Slovakia (and other CEE countries) have performed excellently, not only within the group but also worldwide.

The skill-formation practices of the two companies differ considerably. Put simply, vocational training and the recruitment of well-trained blue-collar workers are regarded as crucial at the German company, while there is much less emphasis on skilled blue-collar work at the Korean manufacturer. The educational systems in the companies' home countries and the traditions of labor relations are particularly important. The German company is characterized by the highly cooperative labor relations it maintains and by the status accorded to skilled workers in the company (Jürgens and Krzywdzinski, 2016). The Korean manufacturer, by contrast, has a long history of antagonistic labor relations, which has led the management to a strategy that avoids reliance on skilled blue-collar work (Jo and You, 2011). In this paper, we will argue that these different approaches to skill formation are also linked to different understandings of technology, and, in particular, automation. These differences are reinforced by different relations between headquarters and subsidiaries. For a long time, the transfer of the German company's home-country skill-formation practices to Slovakia was fairly minimal. Only in 2015/2016 did it substantially expand its vocational education and training (VET) programs. We show how the increasing automation and the decentralization of responsibilities for the product-launch processes supported investments in skill formation in the German case, while the Korean company's specific automation concept and centralization of product launch responsibilities in its Korean headquarters reduced the need to invest in skill formation abroad.

2. Transferring skill formation practices: theoretical framework

Research on skill-formation practices in MNC subsidiaries has been dominated by (neo) institutionalist approaches. We focus here on skill formation for blue-collar workers including:

- the recruitment and training policies for skilled workers (company-internal programs and cooperation with vocational schools); and
- the long-term personnel development approaches (career paths) of this group (vertical/hierarchy careers and horizontal careers).

2.1 The (neo) institutionalist model

Skill formation represents a particular challenge for multinational companies. On the one hand, it is one of the core human resource management (HRM) practices. In particular in

industries and companies characterized by high standardization of products and production systems – such as the automotive industry –, multinational companies have to assure a certain level of standardization of skill formation, which often takes the form of transferring skill formation approaches from their home countries (Chiang *et al.*, 2017; Pudelko and Harzing, 2008; Rosenzweig, 2006). On the other hand, skill formation approaches are embedded in specific institutional conditions, in particular, the educational system and labor relations, which make the transfer of practices particularly difficult (Busemeyer and Trampusch, 2012; Crouch, 2005). Research has shown that MNC's success in transferring their skill-formation practices (and other HRM practices) depends on a number of factors, including their compatibility with host-country institutions (Kostova, 1999). Kostova *et al.* (2008) coined the term "institutional distance" to describe the extent of differences between home-country and host-country institutions. Research on the transfer of production and personnel systems in the automotive industry has accordingly found that the interaction of home-country and host-country effects lead to the hybridization of MNCs' HRM practices and production systems (Boyer *et al.*, 1998).

Yet, recent publications have shown that arguments about the role of institutional distance and hybridization of MNC policies may have been exaggerated. Jürgens and Krzywdzinski (2016) showed that Volkswagen and Toyota have successfully transferred their skill-formation practices globally (see also Florida and Kenney, 2000; Shibata, 2008). A prerequisite was a strong formal standardization of practices and – in the case of Volkswagen – institutional entrepreneurship, i.e. a commitment to establishing vocational education and training institutions in countries with Volkswagen plants. Standardization facilitates the process of global transfer and the implementation and learning of practices at multinational sites abroad (Herrigel *et al.*, 2013). In some cases, MNCs have relied solely on internal company standards; when transferring them, they have isolated themselves from host-country institutions (e.g. Toyota). In other cases – especially in the case of German companies – they have tried to influence host-country institutions, and thus implemented their own concepts (Fortwengel, 2017a; Jürgens and Krzywdzinski, 2016). The role of institutional entrepreneurship of MNCs when transferring their skill-formation practices has also been emphasized in some publications (Ferner *et al.*, 2012; Fortwengel and Jackson, 2016; Wiemann and Fuchs, 2018), while others have stressed the role of initiative-taking by subsidiaries (Dörrenbächer and Gammelgaard, 2016).

2.2 The role of technology

The role of technology has been so far neglected in the "conventional" model of the transfer of HRM practices in MNCs, even though the insight that skill requirements, and thus skill-formation practices are related to the technology used is regarded as common sense in research. In the field of industrial sociology, a number of classical studies (Piore and Sabel, 1984; Kern and Schumann, 1984; Adler, 1988) have argued that there is a positive correlation between technology (and automation) and skill levels. In the economic discussion, similar arguments have been made in the context of skill-biased technological change theory (Autor *et al.*, 1998; Antonietti, 2007; Brynjolfsson and McAfee, 2014; Katz and Margo, 2014). Based on this research, we can, therefore, expect the technological level of the subsidiary as compared with the headquarters to be important for the transfer of skill-formation practices within MNCs.

However, several studies in the sociology of work have shown that there is not a deterministic connection between the level of technology (or automation) and skill-formation practices (Briken *et al.*, 2017; Hall, 2010). This is because the same technologies can be used with different forms of work organization. Highly automated processes can be accompanied

by a strongly polarized form of work organization or by a broad distribution of responsibilities and skill requirements between different groups of employees (Krzywdzinski, 2017; Jo and You, 2011; Jürgens *et al.*, 1993). The impact of technology on work depends on factors such as the type of technology, the organizational context, the technology selection and implementation processes (Liker *et al.*, 1999).

Research on automation approaches of automotive companies (Adler, 1988; Jürgens *et al.*, 1993; Fujimoto, 1997) showed that even in this industry which is characterized by strongly standardized products and production systems, different strategies are possible with regard to the combination of technology on the one hand and skill formation and work organization on the other. In the German automotive industry, the orientation toward high-tech automation in the 1980s and 1990s was accompanied by a strategy of upskilling and professionalization of production work (Jürgens *et al.*, 1993; Kuhlmann, 2004); this was true at least in highly automated areas such as car body construction, while assembly areas continued to be characterized by high shares of semi-skilled workers. Automation approaches of Japanese companies emphasized flexibility and were accompanied by a strong emphasis on qualification and personnel development, which included production workers. However, this did not take the form of formal vocational training but rather of internal company development paths (Jürgens and Krzywdzinski, 2016; Adler,1988). In the American case, by contrast, the studies of the 1980s and 1990s reported a continued orientation toward Taylorist forms of work organization, persistently tight job demarcations and very limited investment in training (Jürgens *et al.*, 1993; Adler and Cole, 1993) – a development that continued into the 2000s (Rothstein, 2016).

We can understand the different strategies pursued by companies as expressions of different "technological frames of reference" in the sense of Orlikowski and Gash (1994; cf. Jones and Orlikowski, 2009; Wajcman, 2006). These two authors dealt with how employees perceive and make sense of information technologies. They defined technological frames as the "assumptions, expectations and knowledge" actors use to understand technology (Orlikowski and Gash, 1994: 17). They emphasized that this also includes understandings of the "specific conditions, applications and consequences of that technology in particular contexts" (Orlikowski and Gash, 1994: 17). While the concept of "technological frames" has mainly been used in research on information technologies (Olesen, 2014; Treem *et al.*, 2015), it also provides a very fruitful basis for analyzing the development and implementation of automation technologies. In turn, the technological frames of companies develop in a specific institutional context and are influenced, for example, by the educational systems and also industrial relations at the locations of the companies (Jürgens and Krzywdzinski, 2016; Haipeter and Jo, 2020).

We can, thus, specify the role of technology in our theoretical model as follows: We expect the skill-formation practices of MNC subsidiaries to be influenced by the technological level of the subsidiary and by the technological frames that define the understanding of automation in the company.

2.3 The role of governance

The second important factor we want to emphasize is the centralization or decentralization of responsibilities within multinational companies. This factor has been at the core of the research on headquarters-subsidiary relations in MNCs (Kostova *et al.*, 2018; Hoenen and Kostova, 2015; Perlmutter, 1969; Heenan and Perlmutter, 1979). The classical MNC strategy literature (Bartlett and Ghoshal, 1989) has developed different models of headquarters-subsidiary relations in MNCs. Bartlett and Ghoshal (1989), for instance, distinguished between the (decentralized) multi-domestic model, the (centralized) global model and the

(decentralized but coordinated) transnational model. Concepts for measuring the centralization of rules and practices in MNCs were developed in the 1980s (Goshal and Noria, 1989; Gates and Egelhoff, 1986; Otterbeck, 1981); they were further adapted in the following decades (e.g. O'Donnell, 2000) and are still used today (Harzing and Noorderhaven, 2008; Lee *et al.*, 2017).

A fundamental characteristic of these approaches is that the centralization of responsibilities is measured in a very generic way. Ghoshal and Noria (1989; see also O'Donnell, 2000) measured centralization using four items related to the extent of subsidiary responsibilities (ranging from no responsibility to sole responsibility) for the four dimensions:

(1) the introduction of new products;
(2) changes in product design;
(3) changes in manufacturing processes; and
(4) career development plans for senior managers.

Gates and Egelhoff (1986) used a more detailed list of items in the dimensions of:

- marketing;
- manufacturing; and
- finance.
- The "manufacturing" dimension contained items related to decisions about subcontracting, production schedules, manufacturing processes, purchasing activities and quality control.

All these dimensions certainly play a role in the skill-formation practices of MNC subsidiaries. For instance, if subsidiaries are responsible for product development, they have to build up the necessary skills and competences. However, the very generic questions on whether MNC subsidiaries can take decisions on product development or on changes in manufacturing processes do not enable researchers to establish a clear linkage between the subsidiaries' responsibilities and the skill requirements. Changes in a manufacturing process can entail small, routine adaptations of the processor bigger leaps in automation. Furthermore, it is striking that research on the transfer of HRM practices has (with a few exceptions, e.g. Ernst, 1997; Adler, 1999; Terwiesch *et al.*, 2001) completely ignored the most important point with regard to the distribution of manufacturing competences between headquarters and subsidiaries, particularly in its concepts for measuring the centralization of decisions in headquarters-subsidiary relations: *responsibility for product ramp-up processes*. Our paper focuses on this point and tries to contribute to the further development of theoretical knowledge about MNC governance and especially about the centralization of decisions in MNCs.

Product ramp-ups are a particularly critical process, as has been shown in sociological research on manufacturing and engineering processes. In the automotive industry, product ramp-ups can take from several months to a year, which is the time required to achieve the anticipated productivity and quality. The ability to quickly ramp up products has a large cost reduction potential for companies. The product ramp-up process consists of several phases (Surbier *et al.*, 2014; Winkler *et al.*, 2007; Clark and Wheelwright, 1992):

- the conception and planning of the production processes, as well as the manufacture or procurement of the required equipment and tools;

- pre-series production, in which the production technologies and processes are tested; and
- the start-up of series production up to full capacity production in the desired quality and productivity.

Product ramp-ups (and introduction processes of new technologies) require close cooperation between product development, planning and production, which places considerable demands on the skills of the workforce (Clark and Fujimoto, 1991; Jürgens, 2000). During such ramp-ups, any remaining problems with the so-called manufacturability of a product are uncovered, as are potential problems with the design of production processes and with the functioning of production technologies.

Only a few studies on MNCs have explicitly addressed strategies in product ramp-up processes, and there is considerable variance in possible approaches. One strategy is to strongly centralize product ramp-up competencies in the corporate headquarters. This reduces the need for skill development at foreign production locations. Ernst (1997), for example, showed that in the 1990s, product ramp-ups in Chinese plants of Japanese electronics companies were prepared and run by teams from the Japanese headquarters – the Chinese plants had hardly any competencies in the whole process. According to Ernst, this resulted from a strategy of risk minimization, which the Japanese management adopted due to the Chinese locations' limited experience and also the limited knowledge of the Japanese management about the conditions in China.

Other studies have identified strategies that are based on a close exchange between headquarters and production sites. In a study on the data storage industry, Terwiesch *et al.* (2001) argued that the successful ramp-up of products by an American company at production sites in Singapore required a massive exchange of personnel (a large number of employees from Singapore spent almost half a year in preparation in the USA), the intensive use of communication platforms and the complete transfer of production equipment and software from the USA to Singapore. Apparently, the skills of the employees at the production site were an important point here. The study by Adler *et al.* (1999) on the product ramp-up processes in the NUMMI joint venture between Toyota and General Motors can be interpreted in a similar way. NUMMI had a so-called mother plant in Japan (Takaoka), where product ramp-up always took place first. In the case of a new product introduction at NUMMI, a pilot team of engineers and workers was formed at an early stage to organize communication between the product development, process engineering and manufacturing teams, and thus to prepare the ramp-up. This pilot team was sent to Japan, where it participated in the ramp-up of production at the Takaoka plant. Afterward, the team was responsible for coordinating the preseries production and the start of series production at NUMMI with the support of Japanese ex-pats and on the basis of the production equipment sent from Japan. This process ensured that the skills required to master the product ramp-up were developed in the American factory.

2.4 Heuristic framework

To sum up, our heuristic framework focuses on two major factors influencing skill-formation practices in foreign locations of MNCs: technology and the centralization of competences in the company regarding production ramp-up (Figure 1). We see these firm-level factors as an important extension of the conventional (neo) institutionalist approach.

We understand the conventional (neo) institutionalist framework as including the institutional context (the institutional conditions in the MNCs home country, the institutional distance between the home and host country), the organizational context

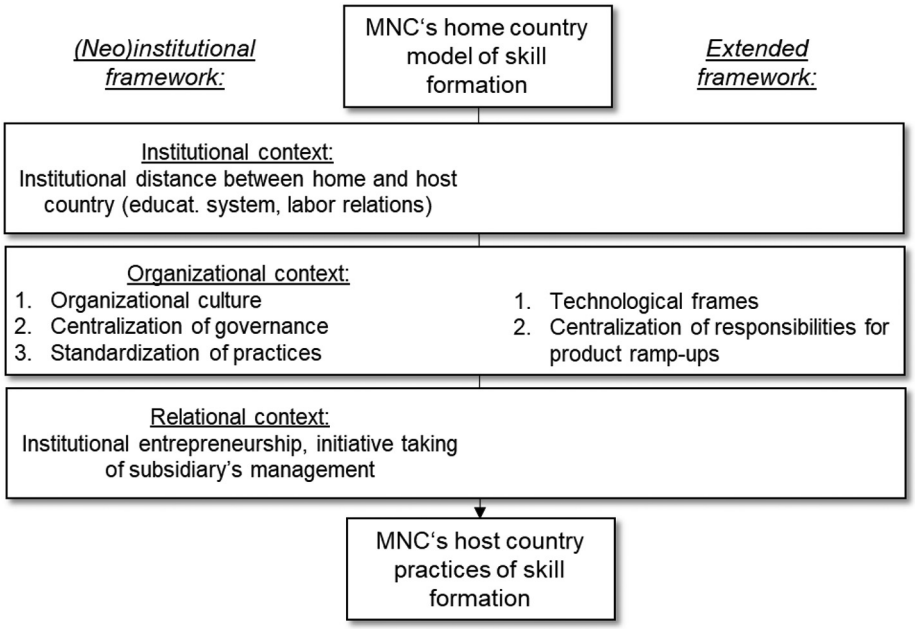

Figure 1. Theoretical model for the transfer of skill-formation practices in MNCs

(the centralization and standardization of rules and practices in the company, the organizational culture) and the relations between headquarters and the subsidiary of the MNC (institutional entrepreneurship of the MNCs management, initiative-taking by the subsidiary's management).

In our extended framework, we add two factors to the organizational context. First, we emphasize that technology and technological frames have to be considered as an important factor influencing MNCs' skill-formation practices in their host countries. We see technological frames as part of the organizational culture. In addition, we expect that the technological level of the subsidiary influences the extent to which MNCs will try to transfer their home country practices of skill formation. It should be noted that the technology (e.g. automation approaches) and the technological frames (i.e. the assumptions about the application and consequences of the technology for the organization) of the companies themselves are *influenced* but *not determined* by the economic and institutional conditions (Section 2.2).

Second, we argue that for our specific topic – the analysis of skill-formation practices for blue-collar workers in manufacturing companies –, we have to go beyond very generic conceptualizations of governance centralization. We suggest focusing on responsibilities for product ramp-ups as a core process with a strong influence on skill requirements in the blue-collar area and as a way how to operationalize governance centralization.

3. Methodological approach and data

The analysis is based on comparative case studies of skill-formation practices at a German and a Korean automotive company in Slovakia – hereafter called GerCar and KoCar. A case study approach was chosen to analyze the complex processes and mechanisms influencing

the development of MNCs' skill-formation practices across national borders (Edwards *et al.*, 2007; Yin, 2009).

We selected the two cases that are the most similar in terms of the sector, the product, the manufacturing processes and the technological level – both are successful automobile mass producers with high automation levels – but they differ with regard to skill-formation practices and the two factors of interest to us: the division of labor, more specifically the governance of responsibilities between the headquarters and the global subsidiaries and the understanding – or framing – of technology (Gerring, 2007). We will discuss these differences in Section 4. It is worth emphasizing that we do not benchmark the companies. Both selected cases are highly successful plants, both master high automation and quick product ramp-up processes. They do it, however, with different skill formation approaches.

Table 1 presents basic information about both cases. GerCar's presence in Slovakia goes back to the beginning of the 1990s. In the 1990s, the plant underwent continuous modernization of its production equipment and product range. Its current production program includes SUVs and small A-segment cars. The fact that the small car production line includes traditional combustion engine power trains and pure electric power trains further increases the product complexity. All these products are produced exclusively in the Slovak plant.

KoCar was founded in the mid-2000s and was the company's first site within the EU. The factory uses 3,800 workers. The main products of the factory have been C-segment sedans and a small sports utility vehicle (SUV). The sedans were developed for the European market and are produced exclusively in Europe. The SUV is produced in Korea, China and Europe.

The analysis is based on in total of 26 in-depth 1 h to 2 h interviews. We focused on interviews with managers responsible for setting up the plant's skill-formation practices, for example, representatives of HR management (including persons responsible for the training programs) and production management, both in the companies' headquarters and the Slovak subsidiaries. The case study of GerCar draws on interviews conducted from 2014 to 2016 in the context of two projects on global production and HRM standards at automotive manufacturers (Jürgens and Krzywdzinski, 2016) and follow-up interviews conducted from 2018 to 2019 [1]. In this article, we used four interviews conducted with HR representatives in the company's German headquarters, as well as nine interviews with representatives of the Slovak HR management, production management and the heads of different areas (pilot center, maintenance, body shop, paint shop, assembly shop).

The case study of KoCar draws on interviews conducted from 2014 to 2017 as part of a research project on the global strategies and production system of Korean transnational corporations and follow-up interviews conducted in 2018–2019 [2]. In this article, we used six interviews with R&D, pilot center and personnel management representatives in the company's Korean headquarters, as well as 10 interviews with representatives of the HR management, production management and the heads of different departments (maintenance, assembly shop).

Table 1. Basic information about the cases

Basic information	GerCar	KoCar
Employees (as of 2017)	14,000 (including transmission and component production)	3,800 (including engine assembly)
Products	A-segment and SUVs	C-segment and small SUV
Capacity	400,000	300,000

The data used in the case studies stem from different projects which shared, however, a number of core questions and the methodological approach. We interviewed the same types of actors in both companies. The interviews lasted 1 to 2 h and used semi-structured questionnaires with questions related to:

- the development of employment and skill structures in the plants;
- the development of the production system and technology in the plants;
- global standards for skill formation; and
- evolution of skill-formation practices in the plants.

We supplemented the interviews with analyzes of documents provided by the companies. We consider the similarity of the research design and empirical approaches in our projects as sufficient to assure the comparability of both case studies.

4. The skill-formation practices – the home-country perspective

The research on MNCs and their skill-formation practices have emphasized the transfer processes of home-country practices to the subsidiaries, as well as the institutional factors that promote or hamper this transfer. Our analysis, therefore, starts by presenting the home-country skill-formation approaches of both companies.

4.1 GerCar in Germany

The major institutional factor influencing skill-formation practices at the company level is the skill-formation system – in the German case, the vocational education system. Skilled work at GerCar (and in German firms in general) means that workers have completed a formal vocational training program based on the dual approach, i.e. a combination of school and in house training that leads to a qualification that is recognized beyond the company. Around 1,500 apprentices begin training in all German GerCar plants annually. The standardization of vocational qualifications in the German system implies uniform, industry-wide quality criteria, which are adapted in line with changes in company requirements. Due to the merging of previously specialized fields of competence, new occupational profiles have emerged in recent years. The dual system means that training takes place partly in a public vocational school and partly in the company. As a general rule, practical training at GerCar is becoming increasingly important. Looking at how apprenticeship time is spent in the company, in the past, 60% used to be spent in the training workshops and around 40% in various production areas. Today, the ratio is reversed.

The contents of vocational education include both subject-specific knowledge and topics like teamwork and continuous improvement activities in the GerCar production system. At the end of the training period at GerCar, apprentices take a final examination before the Chamber of Industry and Commerce and are used in direct production for a minimum period of one year. In the context of globalization, GerCar has undertaken its own standardization measures; it has defined two or three core occupations for each of the central direct and indirect areas of the automotive plants (body shop, paint shop, assembly, maintenance, etc.). These are at the heart of training activities and also serve as a reference point for the training programs at foreign locations (Jürgens and Krzywdzinski, 2016).

Skilled blue-collar work enjoys high recognition at GerCar. Skilled workers are a status group in their own right and have their own pay and promotion systems. The skilled worker jobs are mainly in maintenance, quality assurance laboratories, prototype construction, the pilot hall (responsible for product ramp-ups) and technical development. However, GerCar is

increasingly deviating from the practice of using skilled workers only in these "indirect" areas by defining more demanding tasks in direct production as skilled worker activities (Interview GerCar Academy). The best known of these is the position of automated equipment operator, introduced in the 1980s; this job involves mechanized and automated plants in production. While the majority of blue-collar workers in direct production are semi-skilled workers used via temporary employment agencies, the share of skilled workers in direct production is increasing.

The high status of skilled workers and the importance of vocational education at GerCar has been reinforced by two important historical developments. The first one is its experience with the automation push of the 1970s and 1980s, which led to increased use of skilled work and greater recognition of its role. Influenced by changing market conditions, German companies in the 1980s adopted an accelerated automation strategy (Heßler, 2014; Jürgens *et al.*, 1993). The goal was to turn computer-integrated manufacturing (CIM) into a solution for centrally controlled, end-to-end production automation. Their experiences with the problems and complexities of ambitious automation strategies led firms to expand the responsibilities of automated equipment operators, invest in strengthening their problem-solving capabilities and reorient their recruitment strategies to focus on skilled workers with vocational qualifications (Kern and Schumann, 1984; Sorge and Streeck, 1988). These corporate strategies which can be described as high-tech automation using Fujimoto's (1997) concepts, thus, became a driver of the modernization and expansion of vocational training.

These initial developments during the 1970s and 1980s were strengthened by the role and influence of works councils in the German manufacturing sector – an important institutional factor. Works councils pushed for expanding vocational training in companies and the recruitment of skilled workers. At GerCar, there is a consensus between management and the works council on the role of vocational training in recruiting skilled workers (Interview GerCar Works Council). This consensus, along with the cooperative relations between management and the works council in general, forms an important basis for the stability of vocational education and training.

4.2 KoCar in Korea

The institutional framework for skill-formation in Korea is very different from the one in Germany. School-based vocational education and training do not have a very long history in the country. Vocational schools only developed at the end of the 1960s as part of the country's catch-up industrialization. The first phase of this industrialization was based on low-skilled labor. In the 1960s, the government sought to upgrade the economy by promoting the establishment of vocational schools (Park, 2013). Yet, Korean employers have never perceived cooperation with vocational schools as very attractive, which forced the Korean Government to introduce obligatory company quotas for apprentices and cooperation with vocational schools.

The acceptance of this system is low (Jeong, 1995). KoCar, for example, until today only accepts around 100 workers per year on its training programs in cooperation with vocational high schools (these mainly work in the maintenance departments and foundry). Compared with GerCar's vocational training activities in Germany, this is very little. Programs to introduce more extensive vocational training activities have in part failed due to the lack of support from trade unions (Jo *et al.*, 2016: 59). The major form of training for maintenance and other skilled functions is on-the-job training (OJT). The training is in terwoven into the work process and is based on instructions from superiors and experts in the fields themselves. There are no global formal standards for skill-formation practices at KoCar, but the Korean approach is regarded as the major reference point.

The role of skilled blue-collar work is much more ambiguous at KoCar than at GerCar. Our argument here is *not* that workers at KoCar are less skilled than at GerCar because the Korean company relies on pure OJT. This is surely not true as our own studies show (Jürgens and Krzywdzinski, 2016). Our arguments are that:

- the group of skilled blue-collar workers is smaller at KoCar than at GerCar due to the specific automation strategy described below; and
- that skilled workers enjoy a much higher status at GerCar, while at KoCar there is no status differentiation as workers in direct production and indirect areas (e.g. maintenance) belong to the same grades.

The major differentiation factor at KoCar is seniority and competence but not the tasks and skill requirements of the job. In this respect, KoCar illustrates the person-based system, which differs strongly from the job-based approach at GerCar (Jürgens and Krzywdzinski, 2016).

The limited role of skilled blue-collar work at KoCar and its subsidiaries is based on two important historical developments. First, KoCar's experience with automation differs significantly from that of GerCar. Since the 1970s, KoCar has pursued a very ambitious automation strategy, which has been accompanied by a strong modularization of production that aimed to reduce complexity (Lee and Jo, 2007). Digital process-control technologies were also introduced at an early stage to centrally monitor production processes. In view of limited skills in the blue-collar labor force, KoCar opted for engineering-led automation (Jo and You, 2011). This approach has also been characterized as a "skill-saving" strategy that minimizes investment in worker education and training (Youndt *et al.*, 1996). KoCar invested in the expansion of its own training programs for engineers and increased the proportion of engineers in the direct production and indirect areas (Jo *et al.*, 2016). All process-control and problem-solving tasks were concentrated in the hands of the engineers.

The development of engineering-led automation was also related to industrial relations – an important institutional factor. During the period of military rule, the state's development strategy – even for large companies such as KoCar – relied on keeping wages low. The state promoted company-friendly "yellow" unions and suppressed all efforts to organize workers freely. Under these conditions, industrial relations were marked by mistrust and conflict developed – a trajectory Cho (2005) called "militant economism." Independent unions emerged despite state repression. They rely on their mobilization strength to achieve material concessions and reject any cooperation with management (Yoo, 2012). Management, in turn, does not invest in the education and training of workers because it cannot expect such investments to result in better performance (Jo and You, 2011).

5. Transferring skill-formation practices to Slovakia

In the institutionalist framework, transfers of MNCs' home-country practices are mediated by the institutional distance between home and host country and also by factors such as the standardization level of the practices and the institutional entrepreneurship of management at the host-country location. Regarding the institutional framework of skill-formation practices in Slovakia, school-based vocational training plays an important role. Around 70% of all high-school students are enrolled in vocational schools (CEDEFOP, 2016) but only a minority of these schools co-operate with companies and offer programs combining school-based and in-company internships. This purely school-based system differs strongly from both the German and the Korean approaches and reflects high institutional distance (Jürgens and Krzywdzinski, 2010). In 2016, however, the Slovak Government reformed regulations on vocational training to allow the introduction of so-called "dual" programs

that follow the German approach and include 50% in-company training (CEDEFOP, 2016). As this policy shift illustrates, the institutional context for the transfer of the companies' skill-formation practices can be regarded as relatively permissive (i.e.it is characterized by relatively low institutional strength, Fortwengel, 2017b), as there is no regulation or collective agreement that would enforce a specific approach to skill formation (e.g. a quota for vocational training of apprentices).

In the following, we analyze the skill-formation approaches of GerCar and KoCar in their Slovak plants. We focus not only on the similarities and differences to the home-country practices but also in particular on:

- the role of technology and technological frames; and
- the governance structures of the companies, in particular with regard to the division of responsibilities in product ramp-up processes.

5.1 GerCar Slovakia

5.1.1 Recruitment and training. As usual at GerCar, skilled workers are a distinct group in the company's Slovak plant and differ clearly from the semi-skilled production workers. The basic requirement for the latter to be hired is a secondary vocational certificate, which does not have to be related to automotive production. All newly recruited direct production workers undergo a two-week training course at the beginning of their employment, followed by two weeks of supervised training on the production line (interview GerCar Academy).

While no specific vocational qualification is required for semi-skilled production workers, automated equipment operators in direct production (in particular the welding shop) and workers in indirect areas (maintenance and others) are regarded as skilled workers (interview GerCar Slovakia body shop manager). A relevant vocational qualification and professional experience are considered necessary. Especially in the 1990s, GerCar Slovakia was able to rely on the experienced industrial workers who had been let go by the former socialist manufacturing companies. The labor market situation at that time made it possible to apply a rigorous selection process, during which not only professional knowledge but also motivation, willingness to learn and other desired characteristics were tested.

For these reasons, GerCar's own vocational training in Slovakia remained relatively limited until the 2000s, with around 20 apprentices being taken on each year for the VET program run jointly by GerCar and a vocational school. After around 2013, however, GerCar began to face difficulties in finding enough skilled workers on the labor market. In 2016, the company decided to create its own so-called Dual Academy to organize the internal vocational education and training and the cooperation with vocational schools (interview GerCar Slovakia HR). Vocational training expanded rapidly. From 2017 on, 100 new trainees were taken on annually. The training courses past four years, with a university entrance qualification being acquired in addition to the vocational qualification. The education is organized according to the German model, with 80% of the time being spent in GerCar internal courses and projects and 20% being organized by the Slovak vocational school. The graduates receive German VET certification (according to the standards of the Chamber of Industry and Commerce of Baden Württemberg), and the corresponding Slovak VET certificate. In 2020, the first cohort of graduates left the academy and was hired as GerCar workers.

GerCar Slovakia offers seven vocational qualifications (interview GerCar Slovakia HR): mechatronics technicians (*Mechatroniker*, around 25% of all apprentices), automotive mechatronics technicians (*Kfz-Mechatroniker*, 25%), electronics technicians for automation

technology (*Elektroniker für Automatisierungstechnik*, 30%), tool mechanics (*Werkzeugmechaniker*), Industrial Mechanics (*Industriemechaniker*), warehouse logistics experts (*Fachkraft für Lagerlogistik*) and computer-science experts (*Fachinformatiker*), with the last four occupations representing around 20% of all apprentices. The training of computer-science experts represents an interesting case because it shows that GerCar Slovakia is using the most modern training programs, which are regarded as particularly important for future changes in automation concepts. The training for computer-science experts combines knowledge of traditional automation concepts (including CNC and PLC programming) with expertise in third-generation programming languages (e.g. Java, which is often used in the automation field) and new process-control software systems.

5.1.2 Personnel development. The management's recognition of the importance of skilled workers for the successful development of the plant is reflected not only in the expansion of vocational training but also in the internal development opportunities available to workers from direct production. While there are no long-term work-life plans for workers as is the case at Toyota (Jürgens and Krzywdzinski, 2016), the internal labor market opens up a number of opportunities for vertical and horizontal development opportunities.

The first typical development path for workers is to rise in the hierarchy (interview GerCar Slovakia HR). A career begins with an appointment as a team leader. The supervisors (*Meister*) are recruited from the ranks of the team leaders. The next hierarchical level, section leaders (*Fertigungsabschnittsleiter*), is recruited from the supervisors; here, a secondary vocational certificate with university entrance qualification is assumed. The shop/department manager level requires a university degree. While some shop/department managers at GerCar entered the company through the trainee program for university graduates, others started as production workers and either had finished university studies before entering GerCar or did it while working there.

The second important development path for workers leads from production to indirect areas such as maintenance, quality assurance, tool making and the pilot hall (interviews GerCar Slovakia body shop manager, head of maintenance, head of the pilot center). This path requires vocational training in a technical profession and professional experience. Some production workers also study alongside their job to increase their chances of moving into an indirect area. The company supports these activities. In 2017 and 2018, 200 experienced production workers received two years of training as mechatronics technicians and were promoted to automated equipment operators, maintenance workers or pilot hall workers. Workers from pilot hall maintenance can move into white-collar areas such as process engineering or planning if they finish a university degree while working.

5.1.3 Automation and role of the plant in production ramp-ups. In our interviews, management provided two explanations for expanding the VET program and supporting the upskilling of production workers:

(1) the increasing automation of production; and

(2) the particular responsibilities of the plant in production ramp-up processes.

Managers explicitly emphasized that the legal changes in Slovakia had had little impact on the company's decisions about VET (interview GerCar Slovakia HR).

Around 50% of graduates from the Dual Academy are going to be hired in maintenance (mainly the mechatronics technicians, the electronics technicians and computer-science experts), around 25% as automated equipment operators (mainly the mechatronics technicians and the electronics technicians) and around 25% in the pilot hall and tool making (mainly the automotive mechatronics technicians, the industrial mechanics and tool mechanics).

Since around 2015, the automation level in the body shop has increased from around 70% to above 90%. The GerCar plant has particular expertise within the group in forming and joining aluminum due to its specialization in premium SUVs. The increasing degree of automation, along with the introduction of new materials and processes, has significantly increased the necessary skills in recent years (interviews GerCar Slovakia body shop manager, head of maintenance). This is most evident in maintenance. While in the past, maintenance staff was mainly experienced production workers with a secondary vocational training qualification, for example, in electrical engineering and several years of work experience in the body shop (or other shops), the new technologies require more systematic and complex technical and process knowledge.

Besides increasing automation, the growing responsibilities of the GerCar plant in product ramp-up processes represent an important factor influencing skill requirements (interview GerCar Slovakia head of pilot center). Product ramp-up is the last phase of the product creation process *(Produktentstehungsprozess*, PEP), which at GerCar is usually stimulated to take 48 months. The first year is dedicated to strategic product planning, which is handled by the company headquarters. Once the basic concept has been established, factories can apply to produce the model and a location decision is made. Now product development in the narrower sense begins; this should ideally be completed at least 12 months before the start of production (SOP). A functioning prototype and the manufacturing concept is developed at this point. Normally, the product development phase also takes place at the company's central departments; involvement by future production sites is limited. However, the GerCar Group is endeavoring to strengthen the role of the production plants – a process that has made considerable progress in the case of the Slovak plant.

The product-launch process in the Slovak plant is directed by the pilot center (*Pilothalle*), which uses about 350 engineers and 450 skilled workers. The pilot center's blue-collar workers are usually recruited from the most experienced workers in the plant and the best apprentices from the plant's vocational education scheme. In total, 36 months before SOP, a team of engineers and workers will be formed to work together with the German headquarters to develop the product and manufacturing concept. In the purchasing process, experts from Slovakia are already involved during the product development phase, too.

With the start of the product-launch phase 12 months before SOP, the Slovak plant officially takes the lead for the process. The pilot center organizes the test preproduction series (*Versuchsvorserie*, VVS) and the full preproduction series (*Produktionsvorserie*, PVS), with all the steps now strictly linked and each component having to meet the required quality standards. After that, finally, the zero series, in which everything has to work, takes place.

The pilot center also leads an internal product launch team at the Slovak plant, which includes representatives from all functional areas and shops. An important task is to identify key employee groups for the product launch and to train them. While only a few weeks of preparation are required for most of the assembly workers, other groups such as maintenance workers, programers or automated equipment operators may require several months and, in the case of completely new technologies, 1–2 years of training. In a typical product launch, several hundred employees (on average around 25% indirect and 75% direct) are sent from Slovakia to the German plants of the GerCar Group or to equipment manufacturers for training; they also receive training at the pilot center itself.

5.2 KoCar Slovakia

5.2.1 Recruitment and training. The recruitment process at KoCar does not differ for direct and indirect areas. KoCar hires new workers with a high school certificate or university

entrance qualification. Formal vocational qualifications are not required. New workers at KoCar are first hired via an agency and then converted into full-time regular workers after a one-year evaluation period. Newly hired workers receive a company introduction and safety training for a week. They are then placed at a workstation after one week's training and receive OJT (Interview KoCar HR Manager A).

Of course, working in indirect areas requires more training. During its first years, KoCar relied on experienced, skilled workers hired from other companies. After a short period of time, the company started its own in-house training with OJT and now only relies on external education when necessary. The internal training for skilled workers' positions takes 3–4 years, but unlike GerCar, KoCar does not issue any formal licenses or certificates to the skilled workers to make a move to another company difficult. The rate of turnover is low because the wages at KoCar are relatively high. There are around 100 persons overall who are regarded as core skilled workers (from maintenance but also core workers in areas such as engine fabrication or repair) by the plant management (interview KoCar HR Manager B).

Somewhat similarly to GerCar, KoCar began cooperating with vocational institutes in Slovakia in 2016, to train skilled workers (interview KoCar HR manager A). The company offers 3–4 year vocational training programs focusing on traditional manufacturing professions, namely, mechanics, CNC programers and mechanics mechatronics. In 2019, the mechanics-mechatronics program was replaced by a mechanics-electro-technics program; it includes control unit programing, PLC programming, automation technology and robotics in the curriculum.

Each year, 20–30 apprentices start training, but the company finds it difficult to find good applicants in the local area. In the training program, 60% of the time is spent in KoCar internal courses and projects and 40% in the Slovak vocational school. Around 25%–30% of the apprentices are hired in maintenance, around 70%–75% as automated equipment operators. The engagement of KoCar in this vocational program is a response to a request by the Slovak Government. The program is regarded by the company mainly as part of its corporate social responsibility – regarding skill formation, the company's traditional OJT-based approach is seen as much more important (interview KoCar HR manager C).

5.2.2 Personnel development. The significantly lower focus on skilled blue-collar work compared to GerCar is not only reflected in the more but also limited training activities. There is also a stronger segmentation of development paths. In particular, there is a strict separation between blue-collar and white-collar areas that hardly permits any transitions. The job ladder for a production worker goes from operator to senior operator to supervisor in ascending order. Promotion to a higher job position takes at least two years. The next hierarchical level above the supervisor is the shift leader, which is a white-collar position. About half of the shift leaders are promoted from the supervisor level; the remaining half is recruited from white-collar areas (mainly engineers) in the company. For workers, the shift leader is the highest reachable hierarchy level (interview KoCar HR manager B).

There is hardly any personnel exchange between the direct production and indirect areas. Blue-collar workers in indirect areas are selected at the beginning of their employment at KoCar. Direct workers are only able to switch to indirect areas in a few exceptional cases. It is impossible for blue-collar workers in both direct and indirect areas to move into white-collar areas such as process engineering or planning.

5.2.3 Automation and role of the plant in production ramp-ups. The KoCar plant in Zilina has a very high automation rate (100% in the body shop, 67% in the paint shop). According to management, the requirements of automation were one factor that led to the decision to introduce mechanics-electro-technics training. At the same time, however, the

management emphasizes that this dual VET only plays a limited role and that the internal OJT of skilled workers is more important. The reason why the high automation level has so limited effects on the demand for skilled blue-collar labor is KoCar's specific approach of engineering-led automation.

An important factor that reduces the need for skilled workers at KoCar is the plants' limited role in product ramp-up processes. The responsibilities for the product-launch processes are centralized in the company's Korean headquarters due to the associated economies of scale. In the case of KoCar, the product ramp-up process, the last stage of the product development process, begins nine months before SOP (interview production technology manager at KoCar headquarters).

The responsibility for this ramp-up phase is located at the pilot center in Korea. The pilot center prepares pilot production and checks the state of preparation of KoCar's suppliers. Before the SOP, pilot production is started and tested in the Korean pilot center. At this time, the final adaptations of the production process and production equipment are made. During the pilot production phase, around 40 blue-collar workers from the Slovak KoCar plant are sent to Korea for around six weeks (usually in the form of three 2-week visits) to take part in pilot production, learn about the processes and requirements and have the opportunity to give recommendations about necessary adaptations.

Pilot production (test preproduction) is expected to run smoothly before SOP. At this time, the equipment is shipped to overseas factories, where the full preproduction phase at the local level follows. This phase usually takes one month and is meant to be the last phase of implementing and testing the production processes in the factory. During this time, 40–50 engineers and skilled workers from the Korean headquarters are dispatched to KoCar Slovakia. They direct the product launch and train the local employees. They usually stay in the factory for 2–5 months to provide support and ensure a smooth start of production.

KoCar Slovakia only takes the formal lead for the product launch in the past month before SOP, when the zero series is produced and the new product is finally tested under mass production conditions. Here, the plant has to show that it is able to produce the vehicle by itself. In the case of the sedans, which are produced exclusively in Europe, the product ramp-up processes took two to three months more than usual. In the case of the SUV model, which is also produced in Korea and China, mass production started in Korea first. The product launch in Slovakia benefitted from the experiences gathered in Korea.

5.3 Summary

In both cases, we observe a transfer of home-country skill-formation practices to Slovakia. GerCar has implemented its concept of dual vocational training; remarkably, however, for a long time, this concept was only minimally practiced. Yet, the increasing automation (especially in the context of Industry 4.0), the special requirements of the complex product range and the upgrading of tasks in product ramp-up prompted a massive expansion of vocational training, which is a response to the need for skilled workers. KoCar focuses on the internal OJT of a selective and small group of skilled workers. This approach has its roots in the company's home-country model of engineering-led automation. In addition, KoCar's non-Korean plants have a very limited role in product ramp-up and lower requirements for skilled workers. Although KoCar has started a dual vocational training program, this was done at the request of the Slovak Government and it does not change the company's orientation on OJT as the major form of skill formation.

While GerCar Slovakia supports the upskilling of blue-collar areas through additional VET programs for experienced workers and by promoting transitions and career paths from direct production (semi-skilled workers) to the skilled-worker areas (e.g. maintenance)

and also in white-collar areas such as process engineering, KoCar maintains strict segmentation between direct production, indirect areas (maintenance) and the white-collar area – transitions are only possible in exceptional cases.

Of course, how these two companies will develop in the future is open. It is also worth emphasizing that neither of the two approaches is superior in terms of mastering automation and product-ramps ups and achieving high productivity and profitability. Both Slovak plants under study are regarded as benchmarks in their companies and in the whole automotive industry.

6. Discussion and conclusions

Some of our empirical findings can be explained by the classical (neo) institutionalist paradigm. Both companies have developed different skill-formation approaches in their home countries, which have become part of their organizational culture and are embedded in dense institutional frameworks. For a long time, Slovakia was characterized by a school-based vocational education system, which differed from both the German and the Korean model. At the same time, the Slovak regulatory environment was relatively permissive toward different skill-formation approaches. The government has only recently begun to strengthen dual vocational training approaches (in a combination of school-based and in-company training). The expansion of vocational training at GerCar and KoCa rafter 2016 could, therefore, be related to the activities of the government, and thus to host-country influences. In the case of GerCar, the new policies of the Slovak Government reduced the institutional distance and in this way reinforced the company's focus on dual VET. In the case of KoCar, we could argue that the new VET policies increased the institutional distance (by moving from a purely school-based to a dual VET approach) but also created certain normative pressure on companies, resulting in the hybridization of skill-formation practices within the company's Slovak subsidiary.

Yet, while this explanation is not wrong, it is incomplete. Our interviews with managers show that dual VET in cooperation with vocational schools is accorded a very different priority in both companies under study. The differences between both companies become even more clear if we look at the personnel development activities for blue-collar workers: While GerCar supports upskilling and transitions from semi-skilled to skilled-worker areas, this is not the case at KoCar.

As our analysis shows, we need to integrate the role of technology and the centralization of responsibilities within MNCs to fully understand the evolution of skill-formation practices. In the case of GerCar Slovakia, the interviews with managers show that state support for dual vocational training is welcome; nevertheless, it is not the actual reason for the expansion of vocational training. The motives for modernizing and expanding vocational training activities were strongly related to technological changes – increasing automation and the growing complexity of automation solutions in the context of Industry 4.0 – as well as to the plant's increased long-term responsibilities, for example, in product ramp-up processes. Without these changes, no comparable expansion of vocational training would have taken place.

In the case of KoCar, the implementation of dual vocational training can only be understood as a case of hybridization by host-country influences if we look at the surface. If we look more deeply, we see that this type of skill formation is assigned limited importance by the management of the plant. The core skill formation process remains internal OJT. In addition, the company's engineering-led automation concept relies less on skilled blue-collar workers than it is the case at GerCar. To be clear: we do not argue that dual vocational training in the German tradition provides higher skill levels than pure on-the-job training.

Our argument is that the group of skilled workers is smaller and their status in the company is lower at KoCar than at GerCar. The importance attached to skilled blue-collar work in the production systems of both companies differs considerably.

Our first main conclusion, therefore, is that we have to introduce technology as a relevant variable into institutionalist frameworks. More specifically, we should consider the company's general understanding of technology (the technological frame) and the specific technology level of the subsidiary when analyzing skill-formation practices. The relationship between technological level and skill-formation practices is straightforward: It only makes sense to transfer skill-formation practices abroad if the foreign subsidiary is characterized by the same level of technology as the headquarters.

Technology, however, cannot be studied in isolation from social organizations. Companies are socio-technical systems (Wajcman, 2006) in which technology is linked to work organization and to conceptions of skill. We have argued that the concept of "technological frames" (Orlikowski and Gash, 1994) be used to describe the (company-specific) understandings of the relationship between technology and organization, in particular regarding automation technologies. KoCar understands automation mainly as a labor-saving instrument and emphasizes the use of digital process-control systems and the centralization of information in the hands of engineers. Automation here is unrelated (and partially even opposed) to skill formation in the blue-collar area and the empowerment of blue-collar workers. In the case of GerCar, past experiences have led to an understanding of automation technologies that emphasize the need to combine central process control by engineers and supervisors with the skills and competences of blue-collar workers operating the automated lines.

Our second conclusion concerns the governance of the MNCs. The centralization of rules and responsibilities within the MNCs has been a central issue in the (neo) institutionalist research on the transfer of HR policies. However, centralization has so far been measured and investigated using very generic concepts that are not suitable for the analysis of skill-formation practices in manufacturing plants in MNCs. We propose a focus on the product ramp-up as a core process that influences skill requirements in manufacturing, in particular. Beyond our specific case, we emphasize the use of case-specific concretization of generic measuring instruments for variables such as centralization to obtain meaningful results.

In particular, the role of technology and technology frames in the development of management practices in MNCs is a key issue for future research. On the one hand, this concerns company-specific, industry-specific and country-specific forms of understanding and using technology. On the other hand, this also applies to the use of technology for the governance of MNCs. Here, research on MNCs can benefit from the extensive research on the implementation of information systems in companies and also from scholarship on the effects of technology on work (Galliers and Leidner, 2014).

Our empirical research design has one important limitation which points to the need for further research. As our analysis is mainly based on management interviews, it allows us to capture the relationship between automation approaches and recruitment, training and personnel development strategies. It does not provide the possibility, however, to analyze the actual labor process and the division of labor between blue-collar workers and engineers. Based on our analysis, we expect to find a much stronger involvement of blue-collar workers in problem-solving and optimization in the case of GerCar compared to KoCar. The test of this hypothesis would require a research design based on interviews with workers and workplace observation, which we could not realize in our project.

Notes

1. Ulrich Jürgens and Martin Krzywdzinski, "Personnel and Production Systems in the BRIC Countries"; Martin Krzywdzinski and Valentina Mählmeyer, "Performance Management Policies in International Comparison."
2. Hyung Je Jo, Jang Pyo Hong, Jun Ho Jeong, Joongsan Oh and Chulsik Kim, "A Global Strategy of a Korean Transnational Corporation."

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