

# **Low-skilled Industrial Work: An Overlooked Sector in Labour Research**

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## **Abstract**

The empirical starting point of this contribution is an employment segment that is referred to as “low-skilled industrial work”. Conceptually, this contribution relates to the recent discussion in the field of comparative political economy emphasizing the diversity within varieties of capitalism. It focuses on the German production model which has been regarded as a system dominated by a highly innovative and skill-based system. By comparison, the thesis is put forth that low-skilled industrial work is a central element of a sectoral system of production and work which represents a hitherto overlooked specific “subsystem” of the German national production system. The methodological basis of this contribution is a secondary analysis of data from labour market and social research as well as findings from company case studies.

## 1. Introduction<sup>1</sup>

The article refers to a work type that shall be termed “industrial low-skilled work”. This term is not commonly used in socio-scientific labour research. It focuses on an industrial employment segment including not very demanding and standardised tasks. This work type can be grasped by approaching it with sociology of work categories such as “repetitive suboperations” or “mass workers”, categories that in older studies were in particular applied to assembly operations and residual functions in highly mechanised production systems (cf. Kern and Schumann, 1974, 1984). Empirical evidence shows that this work type has constituted an important employment segment in the German industry till today (cf. Ittermann et al., 2011). These findings contrast with the mainstream assumptions about the prevailing German Production System in comparative capitalism research. As discussed, these assumptions take the dominance of a skill-based and technology-oriented production system in Germany for granted. It has been termed as “Diversified Quality Production” (Streeck, 1992; Hall and Soskice, 2001; Boyer, 2005). According to this view, Germany’s particular economic capacity is based on the development and production of technologically advanced goods with a strong customer and market orientation within the framework of qualification-based and demanding work processes. The capital goods industry, the automotive industry as well as the chemical industry are regarded as typical core sectors of this system. In this view, the enterprises are integrated into a closely-knit institutional system, especially into a well-established occupational labour market. This is regarded as a key prerequisite for the flexible manufacture of the technologically sophisticated products. Unskilled and semi-skilled labour and the respective segment of the labour market are largely ignored by this approach or are considered as only marginal systems and long-term losers of the economic development (cf. Sengenberger, 1987; Bosch et al., 2007). At most, its existence may be explicable with the fact that it concerns a “backward” production type which will sooner or later disappear due to the change process in the international division of labour. However, following the empirical findings about the surprising stability of this employment system this perspective leaves some facts out.

The thesis is that low-skilled industrial labour is a core feature of a specific *sectoral system of production and working*, which constitutes a hitherto overlooked element of the German national production system. The line of argument consists of the following steps: Firstly, the conceptual debate on the internal diversity of national production systems will be summed up and a preliminary definition of a sectoral system will be presented. Secondly, the empirical and methodological basis of the argumentation will be briefly outlined. Thirdly, the basic structures and characteristics of low-skilled industrial labour in Germany will be examined. Fourthly, the key features of an industrial sector with a prevalence of low-skilled work will be ana-

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<sup>1</sup> The paper summarises the findings of a research project funded by the German Research Foundation and entitled “Conditions and Development Perspectives of ‘Simple’ Industrial Labour”. It was carried out at the Chair of Economic and Industrial Sociology at Dortmund University of Technology since 2008. The author would like to thank *Jörg Abel* and *Peter Ittermann* who are members of the research team. Without their contributions the paper could not have been written.

lysed. And finally, the debate on the internal diversity of national production systems will be taken up again and the concept of a sectoral production system will be discussed in more detail.

## 2. The debate on sectoral systems

Conceptually, the topic of this article touches the debate on the Varieties of Capitalism and its basic assumptions postulating a homogeneous structure of the national systems of production. Recently, a number of authors critically refer to this basic assumption. They highlight the following arguments (e.g. Deeg and Jackson, 2007; Lane and Wood, 2009; Crouch et al., 2009): Firstly, the incoherence of different institutional areas with specific regulation patterns is outlined. Especially in large and complex national systems the various institutional spheres are not necessarily completely complementary. This entails heterogeneous and contradictory forms of regulations which open up room for manoeuvre and differing courses of action for enterprises. Secondly, it must be systematically taken into account that the enterprises act as strategic actors and their actions by no means follow a dominant structural logic. For them, institutional regulations are merely opportunity structures which they seek to influence in their own interest, but which they can also keep at a distance or even elude. In more general words, according to these critics, the economic processes are not determined by homogenous and coherent institutional structures, instead in each case specific "possibilities for manufacturing practice" arise from the interaction of institutional structures and corporate strategies. As a consequence, it has to be assumed that within a specific national system companies pursue by no means similar strategies of innovation and production (Herrigel, 2010).

Empirically, this criticism refers to opposing trends (Deeg and Jackson, 2007): On the one hand, the researchers address the consequences of the internationalisation of regulation systems, which in the case of internationally active companies in particular lead to business practices that are no longer compatible with the existing structures; a good example for this are the internationalized conditions of the system of corporate financing and of corporate governance (cf. Deeg, 2009). On the other hand, they refer to the importance of regional and sectoral economic systems, which all in all have a "sub-national" character. It can be assumed that such "subsystems" are connected to the given national institutional arrangements by means of specific interlinking mechanisms. But they can definitely also manifest own institutional governance mechanisms that deviate from those of the surrounding national structures. In regional economic research this relation is discussed relatively exhaustively with regard to the specific structures of "local" production systems (cf. Crouch and Voelzkow, 2009; Trigilia and Burroni, 2009).

But the literature has so far not really directed its focus on sectoral particularities. Already at the beginning of the 1990s J. Rogers Hollingsworth and Wolfgang Streeck emphasised that national industrial regimes vary not only with spatial-territorial location but also between functional-economic sectors (cf. Hollingsworth and Streeck, 1994: 271). But due to the international comparative perspective of the authors it remains unclarified what the term *sector* exactly means and whether it is more than the often used notion of eco-

conomic branches. They only give some vague indications about specific features of economic sectors like similar products and technologies, a typical industrial organisation and specific norms and standards about economic performance. Latterly, Marc Schneidberg (2007) analyses the sectoral diversity of the US-system using the example of the energy supply sector but in doing so, he is more interested in the therewith connected dynamics of the overall system than in the demarcation of the individual subsystems. And only recently, it is being speculated whether sectoral particularities might for instance be attributed to specific coordination forms between companies and further relevant actors as well as to sector-specific disparate technology levels; however, the demarcation of sectoral versus national and local production systems is still imprecise (cf. Lane and Wood, 2009).

Suggestions to specify this open issue can be found in innovation research regarding different types of innovation systems. Recently, the concept of sectoral innovations systems has become relevant because it focuses on obvious divergent patterns of technological development within an overall national system (cf. Malerba, 2004, 2005; Geels, 2004; Markard and Truffer, 2008; Dolata 2011).<sup>2</sup> Following this, as essential elements of a sectoral system the following aspects should be highlighted (notably Malerba, 2005: 384):

- a set of typical and specific economic and technological activities brought forth mainly by firms,
- firms with structural similarities and typical relationships among them and also links with relevant non-economic actors,
- relevant institutional arrangements on different societal levels.

Therefore, a sector is not necessarily identical with an economic branch and the boundaries of a sector are marked by the prevailing level of knowledge and technology. Rather, it may overlap several branches because in a sociological perspective sectors are being constituted not only by economic or technological factors but also by non-economic factors resp. social conditions like political actors, social communities and movements and the whole array of institutionalised regulations of a society.

To sum up, a sectoral system can be understood as multidimensional socio-economic space including a set of similarly structured companies with a typical strategy pattern determining the prevailing base of knowledge and technology. This space is also characterised by a distinct coordination mode among these companies and other economic and non-economic actors. The boundaries of a sectoral system are shaped by the prevailing pattern of company strategies and the related level of knowledge and technology. However, the boundaries cannot always be clearly identified because a sectoral system may have local, national and/or global dimensions which often coexist in a sector (Malerba, 2005: 386).

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<sup>2</sup> Although the topics and the questions are similar, this research line has so far had practically no points of contact with comparative capitalism research of political economics (cf. Werle, 2011).

### 3. The empirical base

Findings from quantitative and qualitative research in the German industry are the empirical base of the following analysis. The methods used can be described briefly as follows:

(1) Firstly, it comprises an analysis of data on the prevalence of different forms of work in the German industry. This data is provided by the microcensus of the Federal Statistical Office of Germany and by the IAB-Betriebspanel.<sup>3</sup> Both surveys have in common that data on low-skilled work can only be gleaned indirectly and incomprehensively. The microcensus as a person and household survey focuses with a question concerning the "position in the company" on data about the skill level of workers. The IAB-Betriebspanel as a company and employer survey asks for data concerning the company's personnel and task structure. However, with the help of these multi-choice questions they offer a basis for collecting aggregated data on the distribution of low-skilled industrial labour.

(2) Secondly, the findings are based on company case studies in companies from sectors with a significant share of low-skilled work amounting to more than 30 % of the total employment. All in all, 30 case studies were conducted, ten companies each from the food industries, metal working industry as well as from rubber and plastics processing. These branches had been selected because they represent the highest share of low-skilled employment in the whole industry (see below Figure 1). Due to get access without any problems the case study companies were mostly medium sized with 250 to approx. 500 employees. This company type represents the highest concentration of low-skilled work compared to other size-classes (see below Table 2).

(3) Thirdly, the analysis refers to findings of further quantitative and qualitative studies on the structures and development perspectives of non-research-intensive industries (cf. Hirsch-Kreinsen, 2008; Kirner et al., 2009; Som, 2012). These research findings provide valid data for the research question as there is empirically a high congruence between non-research-intensive industrial sectors and sectors with a high share of low-skilled labour. In both cases the enterprises stem from sectors such as the food industry, the paper, printing and publishing industry, the textile and clothing industry, the metal working industry and the manufacture of rubber and plastic goods.

### 4. Basic structures of low-skilled industrial work

According to the data available in 2009 around 7 million persons in the overall economy and about 1.6 million persons in industry (proportion of all industrial employment: around 22%) worked as low-skilled employees. Over the course of time the number of low-skilled workers in industry has declined markedly especially in the 1990s: At the beginning of the 1990s, more than 3 million people were employed in low-skilled industrial labour according to the microcensus and in 2004 this figure has declined to around 2 million. The percentage of low-skilled workers of all employees dropped from almost 30% (1993) to approx. 25 % (2004). The decline in industrial low-skilled work in Germany must be regarded within the context of the

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<sup>3</sup> Establishment Panel of the Institute of Employment of the Federal Employment Agency

economic structural change and the decreasing share of industrial work, as in the 1990s alone around 2 million industrial jobs were lost (Table 1).

Despite the steady decline, the data shows that around a quarter of all industrial employees continue to do low-skilled work. What is more, there are some indications for a phase of consolidation of this employment segment: According to the microcensus, the number and the percentage of low-skilled industrial workers has remained almost constant between the years 2000 and 2007.<sup>4</sup> In the course of the economic expansion phase after the financial and economic crisis, the number of low-skilled workers was actually even slightly on the rise: by approx. 170,000 employees in the industrial sector.

**Table 1: Low-skilled work in Germany 1993-2007**

|      | Low-skilled work/total |      | Low-skilled work/manufacturing |      |
|------|------------------------|------|--------------------------------|------|
|      | absolute<br>(in 1.000) | in % | absolute<br>(in 1.000)         | in % |
| 1993 | 8,616                  | 23.7 | 3,027                          | 29.2 |
| 1995 | 8,624                  | 24.0 | 2,686                          | 30.1 |
| 2000 | 7,121                  | 19.5 | 2,147                          | 25.1 |
| 2004 | 6,932                  | 19.5 | 2,012                          | 24.7 |
| 2007 | 8,243                  | 21.6 | 2,184                          | 26.0 |

Source: own calculations according to the microcensus 2007; weighted data

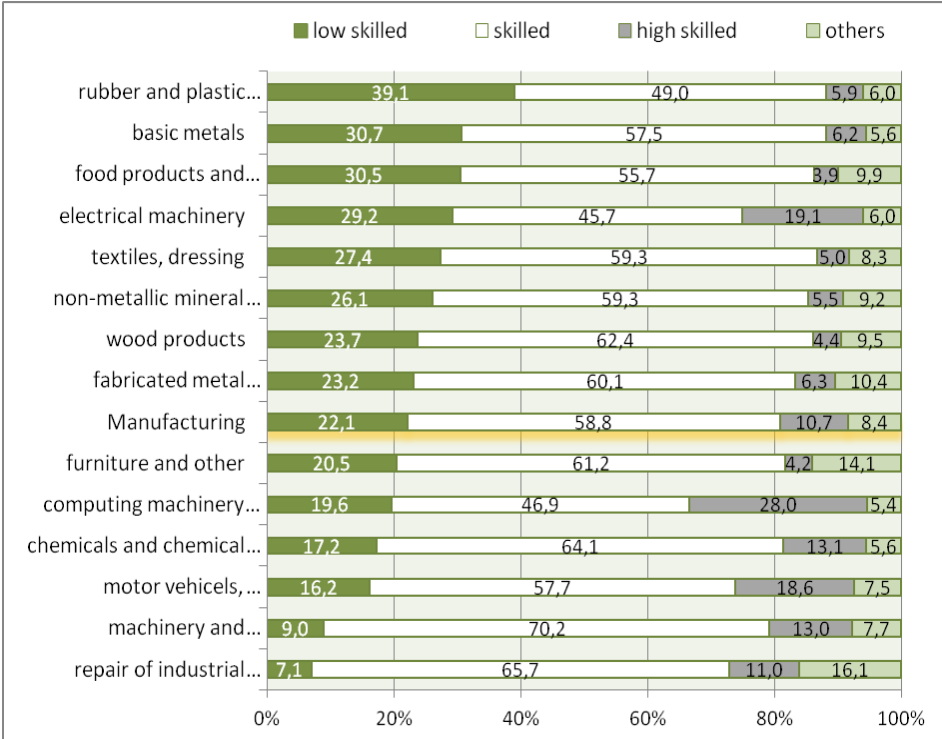
This 'remaining' share of about a quarter of all industrial employees represents a quantitatively significant 'base' in industrial production, as the findings of both the IAB-Betriebspanel and the microcensus show. Moreover, there are also several signs that seem to suggest a stabilisation of a considerable share of simple jobs in the overall economy too (Bellmann and Stegmaier, 2007).

In order to determine the deployment areas of low-skilled work in industry more exactly, it is necessary to take a closer look at the importance of this type of labour in the different industrial sectors. First of all, it becomes apparent that in absolute terms most low-skilled workers are employed in the labour-intensive sectors of the food industry, the steel industry or vehicle construction. More meaningful is an analysis of its relative prevalence, i.e. of the share of low-skilled work of the total employment in the respective industrial sector (Figure 1). It thus becomes evident that simple labour occurs in all lines of industry but that its share varies considerably depending on the industrial sector: The industrial sectors rubber and plastic products (39.1%), metal working (30.7%) and food, beverage and tobacco (30.5%), prove to be strongholds of low-skilled industrial labour, with respectively more than 30% of low-skilled workers – a proportion that is above

<sup>4</sup> On the basis of the data of the IAB-Betriebspanel, a similar trend regarding simple industrial labour becomes apparent: Its share has dropped from around 35 % (1993) to 22 % (2009).

average in comparison to the figures of the industry as a whole. The share of highly skilled work on the other hand is considerably lower in these sectors.

Figure 1: Low-skilled work in German manufacturing industries 2009



In contrast, in the industrial core sectors of the system of German system such as motor vehicles, machinery, and the chemical industry skilled work dominates while the share of simple work tends to be below average. Nonetheless, here, too, a more differentiated view is needed. These industries show considerable disparities: In the automotive industry the percentage of low-skilled labour is much higher in the supplier industry than it is for end producers. And in the chemical industry, too (e.g. production of colours and soaps) or in the electrical industry (manufacture of cables and switches) there are several domains with higher proportions of low-skilled industrial labour.

With regard to the company size, the analysis shows that low-skilled industrial labour is primarily concentrated in medium-sized enterprises (see also Bellmann and Stegmaier 2007). According to the data of the IAB-Betriebspanel, most of the low-skilled workers (almost 300,000) were employed in industrial companies with 200 to 499 employees; the percentage of total employment was 24.4 % in 2010. Altogether, the share of simple labour only varied slightly (between 23.9 % and 24.4 %) in the size range between 10 and 499 employees. It was lower in small enterprises with less than 10 employees (approx. 19 %) and in large enterprises with more than 1,000 employees (23 %). In industrial big corporations (more than 5,000 employees) in particular, the share of low-skilled labour is low – here only around 13 % of all employees were low-

skilled workers in 2010, at the beginning of the last decade this figure was considerably higher (2000: 22 %); in this period more than 50,000 jobs in total were cut in the large-scale enterprises.

**Table 2: Low-skilled work in Manufacturing Companies 1993 -2010 (in percent of total employment)**

|                         | 1993        | 1995        | 2000        | 2004        | 2007        | 2010        |
|-------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1 - 10 employees        | 14,9        | 15,9        | 20,5        | 14,3        | 21,9        | 19,3        |
| 10-99                   | 28,6        | 26,5        | 27,8        | 25,2        | 25,2        | 23,9        |
| 100-199                 | 34,9        | 35,1        | 36,3        | 27,2        | 24,7        | 25,8        |
| 200-499                 | 35,3        | 32,3        | 31,2        | 30,1        | 25,7        | 24,4        |
| 500-999                 | 34,1        | 34,4        | 31,9        | 26,0        | 23,2        | 21,7        |
| 1.000-4.999             | 30,9        | 29,8        | 26,2        | 25,6        | 21,7        | 23,1        |
| 5.000 employees or more | 24,4        | 24,8        | 22,5        | 14,0        | 10,3        | 13,8        |
| <b>Total</b>            | <b>29,6</b> | <b>28,6</b> | <b>28,9</b> | <b>24,6</b> | <b>23,0</b> | <b>22,6</b> |

Source: own calculations according to IAB-Betriebspanel

## 5. Sectoral production system

According to the available data, a surprisingly large segment of low-skilled labour can be identified in the context of the German production system. At first glance, it may be indeed regarded as a “backward” production type. It comprises traditional lines of industry and companies that on average manifest low growth rates and whose development is dominated by established and standardised technologies (cf. Expertenkommission Forschung und Innovation, 2011) that can easily be imitated by business rivals. The complexity of the products is predominantly low and the prevalent method of production – mostly standardised serial production – is atypical of the German production system (Kirner et al., 2009). Furthermore, these companies are in an economically precarious position and the rapid decline of branches like the textile and furniture industries supports this assumption. However, the available figures show that low-skilled industrial labour is by no means a generally shrinking segment of industrial production. Following the hypothesis formulated at the outset, this type of work can be regarded as a central element of a sectoral production system, its basic characteristics will be analysed below.

### 5.1 Corporate strategies

The starting point of the analysis of a sectoral production system has to be the company level with its typical economic and technological activities (see Section 2). These activities will be subsumed under the term “corporate strategy”. Following organisational sociology, the term “strategy” reflects on the one hand management decision-making processes and the various actors inside and outside an enterprise influencing it. On the other hand, it refers to technological, organisational and environmental conditions that impinge upon decision-making (cf. Child, 1997). The following dimensions of the predominant corporate strategies can be determined more exactly:



## a) Work organisation

The *organisation of work processes* can be regarded as a main feature of the prevailing company strategy pattern. Summing up the research findings, one can characterise the prevailing pattern of work organisation as "Tayloristic". However, this organisation principle takes on different forms though:

One variant in this spectrum is a form of work that can be referred to as *classic-Tayloristic*. Its central feature is a form of labour that is characterised by a very low technical-functional complexity and a distinct degree of routine activities. The employees have virtually no autonomy of action as no planning or steering tasks whatsoever accrue. Instead, the tasks are meticulously pre-planned and are subject to ongoing control. The qualification requirements are therefore very low, solely job-specific and can for all intents and purposes be seen as job requirements in the sense of basic requirements of civilisation. Accordingly, only very short training periods are needed. These tasks are often performed by women. Typical in this respect are the manual operation of specialised and simple machine tools for an automotive supplier, tasks such as short-cycle machine loading and the assembly of simple heating elements in metalworking companies, very simple packing activities in the furniture industry and monotonous monitoring activities in the food and beverages industry. All aspects considered, it is a matter of tasks such as 'operating machines' and 'manufacturing', that statistically account for more than 55% of the activities of low-skilled work in industry.<sup>5</sup>

A second variant in the spectrum is a form of work that can be referred to as *flexible Taylorism*. Here an enlargement of the classic-Tayloristic mode by means of a limited extension of the technical-functional task structure is observable. This enlargement goes along with a scope of action for the employees, e.g. as regards autonomous decisions on personnel deployment to compensate short-term capacity peaks, or quality assurance in the ongoing operations. Also the rotation of employees between different simple workstations is an element of this work organisation. All the same, these activities are usually integrated into a highly differentiated company hierarchy with a high command and control potential. Examples for this from the research sample are forms of enlarged low-skilled work in a metalworking company, where very simple assembly activities, likewise for the most part performed by women, are upgraded with logistics, inspection and post-processing tasks. This goes along with longer cycle times and room for self-organisation. Similar trends are observable in some of the examined companies from the food and beverages industry, where forms of team work were introduced, aiming at flatter hierarchies, a larger flexibility and a certain degree of self-organisation. This often necessitates training measures so that the employees can master the additional tasks. All in all, this work organisation aims at an intensified flexibility of the process without a considerable upgrading of the skill level.

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<sup>5</sup> Own calculations based on the microcensus 2007.

## **b) Technology level**

These Tayloristic forms of work correlate with a *limited technology level* of the products and the processes. The companies are evidently not able to tap the generally given technological opportunities of process automation. Given the flexibility requirements of the markets the costs of automation are very high. A further aggravating factor are the often only limited technological competencies of small to medium-sized enterprises that tend to capitulate in the face of challenging automation projects. In addition, for various procedural and material reasons, there are evidently technical barriers to a further automation of the production processes. Such barriers can be found in assembly processes in the metalworking industry and in packaging processes in the food and beverages industry, resulting in a stronger reliance on simple manual work in these companies. Moreover, existing examples of far-reaching process automation show paradoxical consequences: On the one hand, low-skilled jobs break away; on the other hand new jobs for the low-skilled are created; typical for this are newly emerging 'mechanisation gaps', simple activities such as the loading of machines as well as routinised controlling and monitoring work in the plastics industry.

The product technologies that predominate in this sector are mostly in a very advanced development stage. They are highly standardised and can be characterised as mature technologies. Typical examples are the manufacturing of standardised metal and plastic parts, the mass production of bakery goods or of simple office chairs. For these products, hardly any further innovation opportunities, which would result in lasting structural changes in the production and work processes, seem viable. Therefore, at most limited innovation activities take place and they remain within the limits of established technological routines. The innovations are mostly geared at either the production-related optimisation of the products and/or at their market and customisation. These may include a fashion-oriented redesign of products, the functional and technical upgrading of products, a rapid customisation according to changing customer demands, clever branding strategies, a concerted deployment of logistics and delivery systems and the expansion of product support services. These product innovations, that always have a limited character, can be handled without difficulties within the described working structures. They do not entail rising or frequently changing technology-related job requirements which would call for an enhanced scope of action and a higher qualification level of the employees than is required in the context of the Taylorist structures.

## **c) Marketing strategy**

The marketing strategy of the companies is generally characterised by a pronounced market and customer proximity. It can be termed as *flexible marketing strategy*. The companies employ it in the hope of gaining a competitive edge, particularly so in the highly competitive market of price-sensitive standard products. On the one hand, it concerns the production in series of standardised parts e.g. in the segment of automotive supplies that have to be reliably delivered "just in time". On the other hand, it also concerns companies that target pronounced market niches characterised by the demand for special, often older standard products.

Typical for this is the spare part business of metal companies with simple parts, which secures a stable turnover for many years. Such market segments do not allow for extensive mass production of the standardised products and are therefore of no particular interest to large internationally operating competitors. These markets often demand a short-term delivery readiness of the companies, which they can only comply with due to customer-oriented and as a rule also domestic production sites. Occasionally, the enterprises try to further improve their competitiveness by constantly increasing the flexibility of their production processes. For instance, they decrease the batch size and intensify the customer orientation of their manufacturing process. They thus hope to secure their domestic production sites against foreign low-price competition that is particularly fierce in some of these industries such as the furniture and metalworking industries.

The consequences of this marketing strategy for the work organisation are of varied nature: Firstly, despite a certain flexibilisation the remaining high pressure on prices and costs call for a minimal cost production structure that can only be put into practice by means of the above described forms of work. Secondly, the increasing flexibility of the production further reduces the already limited scope for a profitable and technically manageable automation of simple activities and thus the low-skilled jobs are maintained. Thirdly, it leads to a stabilisation of the domestic production sites. The regional proximity to domestic customers is a prerequisite for the strong customer orientation, for instance the ability to deliver overnight. Fourthly, for the same reason outsourcing strategies into lower-cost foreign countries often reach their limits. The logistics and information problems with production sites abroad are frequently hardly manageable for medium-sized and small enterprises and would jeopardise their customer orientation and ability to deliver.

## **5.2 Company structures and coordination modes**

As outlined above (see Section 2) a sectoral system is also characterised by companies, which show considerable structural similarities. Following the available findings the prevailing company structures are marked by two main features: Firstly, the companies are an element of branches with mainly mature technologies and secondly, industrial low-skilled work can be found mostly in small and medium-sized companies (see Table 2). The interplay of both aspects leads to a prevailing structural pattern of the firms which is well-known from SME research (cf. Weimer, 1992; Bluhm and Schmidt, 2008). This pattern is featured by only a limited set of resources and capabilities for strategic action. The small-scale firms have only few resources of capital, capacities and know-how and the degree of professionalisation of the management is often low. Furthermore, due to normally absent R&D departments technological capabilities exist only in rudimentary form. In contrast, manufacturing processes and product development take place on a highly practice-oriented level and are brought forth by only small group of management representatives and technical experts (cf. Hirsch-Kreinsen, 2008).

Therefore, it appears that low-skilled companies do not participate in those collaborative exchange relations regarded as the typical coordination mode of the dominating German production system. First of all, this becomes clear from the lack of cooperations with other companies as well as with further organisations such as research and scientific institutions (Kirner et al., 2009; Som, 2012). There are various reasons for this: For one thing, the small and medium-sized enterprises that predominate in this sector are generally relatively reserved about cooperative relations with external partners. Secondly, in these sectors such as e.g. the food and beverages industry and the plastics industry, associations only play a subordinate role as intermediary agencies. As expert meetings with representatives of these associations have repeatedly shown, it is almost impossible to harmonise the diverging interests of the companies. Thirdly, research cooperations are relatively uncommon because of the mature character of their technologies.

In addition, their customer relations usually do not have that collaborative, even informal character that is typical for producer-user relationships in some core branches of the German system like the mechanical engineering branch. Despite many low-skilled companies are positioned as suppliers in the value chain of large enterprises and their relationships can be characterised as either market-based or hierarchical. On the one hand they are most notably to be found at the level of part suppliers of simple products and therefore face high competitive pressures and can be easily replaced. On the other hand they normally act under the pressure of the large customers concerning prices, quality standards and delivery times. This is in particular shown by the examined cases of automotive suppliers who interact with their purchasers under market conditions, encounter strong pressures and often face unexpected and rapid changes in the demand conditions. According to the available data this was the case for a little more than half of these enterprises in 2006 (Kirner et al., 2009). Therefore, the prevailing coordination modes of these companies can be denoted as market and hierarchy.

According to available findings, low-skilled companies are only networked with regional "neighbouring" and "supporting" companies and organisations in exceptional cases (e.g. Campagna, 2010). A well-examined example for the regional embedding of low-skilled work companies and for close intra-company ties is the furniture industry cluster in East Westphalia (cf. Rafiqui et al., 2009). Here the geographical proximity and collaborative relations with both suppliers and customers play an important role for the economic performance of the companies as it helps to avoid logistical problems and allows for the trouble-free and rapid availability of parts and products. The proximity to producers of product technologies is also of importance to a number of enterprises due to mutual acquaintance and communication and the opportunity it offers of solving problems without further difficulties. And finally, regional and specialised support institutions play no small role for the ability of many simple work companies to act strategically.

### 5.3 Institutional embeddedness

Following the institutional theory debate, the pattern of institutional embeddedness has to be regarded as an additional central feature of a sectoral system. As the empirical findings show, the low-skilled firms are in mostly only loosely or in part contradictorily coupled with the institutional spheres regarded as typical of the German system.<sup>6</sup>

(1) The enterprises evince an only loose coupling with the subsystem of the skilled labour market that is considered to be constitutive of the qualification level and the labour utilisation in the German production system. This subsystem only plays a subordinate role for the low-skilled companies. For one thing, there are only few employees in these companies with a professional training acquired within the framework of the vocational education system. For another thing, many of the low-skilled companies (more than 50%) prefer workers who have undergone a certified training within the framework of the vocational education system.<sup>7</sup> However, these are deployed for tasks outside their field, i.e. for which they are overqualified. For the companies, this group of employees and the extrafunctional qualification components they acquired during their vocational training undoubtedly represent an additional benefit. This benefit consists of a calculable degree of work reliability and of the workers' ability to fill different jobs, making it possible e.g. to implement the flexible Taylorist work organisation without additional qualification measures.

However, due to the widespread deployment of unskilled and semi-skilled labour, the companies face almost no special recruitment and qualification problems. Therefore, they can basically fall back on a market segment that approaches the type of the unstructured labour market. This segment will probably become more important in Germany because of a growing share of temporary agency work, temporary work contracts and mini-jobs. But the unskilled and semi-skilled workers are surprisingly mostly in stable employment. This situation points to the existence of labour market regulations partly different from those of the unskilled segment of the labour market. Following the recent labour market research, this characteristic can be also classified as a closed company internal employment system (Köhler and Loudovici, 2008) or as regulated *internal labour market*. It is characterised by long-term employment and low but stably earned income. This situation can be found in the context of personnel structures that have evolved over time in paternalistically managed SMEs and that typically feature job tenures of many years also in the case of simple work. They can also be found in companies that are linked to the system of industrial relations and in which general regulations for the human resource policy of companies have been laid down.

(2) The coupling mechanism of low-skilled companies with the *system of industrial relations* proves to be similarly differentiated: First of all, low-skilled companies in principle relate to this system with its juridified

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<sup>6</sup> From an organisational sociology point of view, one can speak of a loose coupling if two separate systems either have only few variables in common or if the variables they share are weak in comparison to the other variables influencing the system (Weick, 1979). In the reverse case one can speak of a tight coupling.

<sup>7</sup> Own calculations on the basis of the microcensus 2007.

procedures and general work standards. In this they do not differ from the average industrial company. Thus survey data shows that collective bargaining coverage and the existence of works councils are similarly distributed as in companies with a below-average share of simple work. In the same way this sector shows an average adherence to collective agreement regulations.<sup>8</sup> This adherence to collective agreements and prevailing work standards also manifests itself in the fact that industrial low-skilled workers are only exposed to limited risks of precarisation. As the available data shows, industrial simple labour stands out due to a relatively high degree of stable employment; according to data of the microcensus for 2007, more than 60 % of the industrial low-skilled workers were in so-called standard employment. These figures, too, indicate a low but relatively stable level of income. According to the qualitative research, these employees are generally assigned to the lower agreed wage brackets.

But the empirical findings also show that this situation very often is of precarious character. Thus many low-skilled companies stand apart from the system of industrial relations because the union density in the small to medium-sized low-skilled enterprises is below average in comparison to the core sectors of the German industry; it amounted to only around 16 % in the plastics industry and approx. 25 % in the food and beverages industry in 2007.<sup>9</sup> The reasons for this are the high shares of unskilled and semi-skilled workers who only show little interest in trade union activities. Vice versa, the trade unions often show little interest in organising this group of workers. At company level, this correlates with a weak representation of the employee's side in many enterprises. What is more, some companies do not even have works councils and are not bound by collective agreements.

(3) Similar statements can be made with regard to the systems of corporate financing and of corporate governance. Insofar as empirical evidence is available regarding this question, it can be stated that the prevalent forms of corporate financing correspond to the traditionally established modes in Germany: besides internal funding, companies usually make use of bank loans, that is long-term external capital, i.e. the companies in question are tightly coupled with the long-established German system of main banks and external financing.<sup>10</sup> But at the same time, the predominantly small and medium-sized family enterprises are traditionally less connected with the networked system of corporate governance so far regarded as typical for Germany. As a rule, they are neither involved in cross shareholding relationships that are typical especially of large corporations nor do depend much on the meanwhile internationalised markets for external equity with their specific regulation modes.

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<sup>8</sup> According to IAB- data, a total of approx. 38% of industrial enterprises were covered by (company-based or industry-wide) collective agreements in 2009.

<sup>9</sup> Source: own research.

<sup>10</sup> Cf. the data on the funding of innovations with regard to sectors and company sizes in 2007 in Rammer (2009).

## 6. Conclusion

Summarising the empirical findings a sectoral system can be detected which can be defined as a system of Flexible Standard Production (FSP). Its main feature is a strategy pattern including a Tayloristic work organisation, a limited technological level of the manufacturing process and a considerable customer-orientation. It is also characterised by a lack of collaborative relations with other firms and organisations. Rather, the coordination mode is featured by market and hierarchy. And finally, it is defined by loosely coupled interdependencies between the company's strategies and institutional regulations. This situation is the prerequisite that the low-skilled companies show a stable and competitive position in German "high-tech" and "high-wage" environment. Due to this situation the companies can pursue a strategy with a contradictory character: On the one hand it is a low-cost and low-wage strategy producing standardised and mature products, on the other hand the companies aim at a customer-oriented flexibility based on a certain amount of innovative products.

The peculiarities of the FSP can be highlighted by comparing it to the aforementioned (see Section 1) System of Diversified Quality Production (DQP) (cf. Streeck, 1992). Briefly summarised the main elements of DQP are the following: The prevailing pattern of company strategy focuses on production of highly innovative and technologically advanced products linked closely to customer demands. The demanding work processes are based on skilled employees educated the German system of vocational training. The aggregate structural similar companies includes medium-sized and large companies from the core branches of the German industry like mechanical engineering, automotive industry, the electrotechnical and chemical industry. The prevailing coordination mode is highly characterised by collaborative relations between firms and other organisations, even between competitors. Furthermore, the companies are closely embedded into an institutional system, in particular a skilled labour market, the strongly regulated system of industrial relations and the engineering dominated national system of innovation. In the following table 3 the main features of FSP and DQP are directly compared:

**Table 3: Sectoral Systems of Production and Work**

|            | <b>Company strategy</b>   | <b>Work organisation</b>              | <b>Company structures</b>  | <b>Cordination mode</b>              | <b>Institutional coupling</b> |
|------------|---|---------------------------------------|--|--------------------------------------|-------------------------------|
| <b>DQP</b> | Customer oriented production of technologically advanced products | Skill based, demanding tasks          | Medium and large companies, industrial core sectors, Medium-/high-tech | Prevailing collaborative, networking | Tightly coupled               |
| <b>FSP</b> | Flexible production of standardised more or less mature products  | Low-skilled, Tayloristic organisation | SMEs, Low-tech sectors   | Prevailing market and hierarchy      | Loosely coupled               |

Admittedly, it is difficult to define a sectoral production system always precisely since in the analysis of sectoral production and working systems relatively stable core areas but also fluid marginal areas have to be assumed.<sup>11</sup> The present empirical findings here only provide few indication: So low-skilled work by no means refers to traditional branches but is partly also to be found in the technology-oriented leading branches of the DQP sector (see Figure 1). Thereby the transitions between the sectors are definitely in progress. On the one hand technical-organisational processes of change are to be brought to account in the core areas themselves that can sustainably change their existing production systems and qualification structures in the direction of simpler operations. On the other hand it is by no means constituted that enterprises belonging to the low-skilled system manufacture standardised products in the long run. In fact it cannot be ruled out that increasing market demands as well as technological upgrading strategies of these enterprises lead to a raising of the qualification standard and to the shift of previous sectoral boundaries. Moreover, if these companies are as suppliers an element in value chains they may be influenced by highly dynamic technological factors urging them towards an accelerated technological development (cf. Kinkel and Zanker, 2007).

Strictly speaking, these issues cannot not be sufficiently discussed based on the findings at hand. It has to be emphasised that this article just aimed at the development of a term of sectoral production and working systems. In so far questions of its plausibility and the constitution of such systems had priority with respect to the argumentation. Inevitably therefore not all relevant questions could be dealt with. Particularly the straightly subsequent question of conditions and process patterns of the dynamics of such sectoral systems and the associated question about interdependencies of different sectoral systems existing next to each other remain unsettled. With respect to the current rapid change of economic and working structures it thereby admittedly deals with questions of great empirical and theoretical meaning, which in the further progress of the discussion will have to be placed in the centre of the analysis.

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<sup>11</sup> Without question, the following assessment is true to this day: "There is no generally accepted definition of a sector." (Hollingsworth et al., 1994: 8).



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