

FRAUNHOFER INSTITUTE FOR INDUSTRIAL ENGINEERING IAO

ED.: WILHELM BAUER | OLIVER RIEDEL | FLORIAN HERRMANN

FLORIAN HERRMANN | WOLFGANG BEINHAUER | DANIEL BORRMANN | MICHAEL HERTWIG
JESSICA MACK | THOMAS POTINECKE | CLAUS-PETER PRAEG | PETER RALLY

EMPLOYMENT 2030

EFFECTS OF ELECTRIC MOBILITY AND DIGITALISATION ON THE QUALITY AND QUANTITY
OF EMPLOYMENT AT VOLKSWAGEN



**SUMMARY AND
KEY FINDINGS**

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Ed.: Prof. Wilhelm Bauer, Prof. Oliver Riedel, Dr Florian Herrmann

**Dr Florian Herrmann, Dr Wolfgang Beinhauer, Daniel Borrmann, Michael Hertwig, Jessica Mack,
Dr Thomas Potinecke, Dr Claus-Peter Praeg, Peter Rally**

Fraunhofer Institute for Industrial Engineering IAO, Stuttgart

Study on behalf of the Sustainability Council of the Volkswagen Group

Using scientifically based methods, this study provides essential research into future employment and training requirements at Volkswagen as a result of the current transformation of the automotive industry. It contains findings that are also applicable to other stakeholders in the sector and may therefore have a widespread impact in terms of proactively transforming the employment situation. This project was enabled by the Sustainability Council of the Volkswagen Group, and we would like to express our gratitude to the entire body for its support. In particular, we would like to thank Michael Sommer, who initiated the research project and brought together all the requisite experts. In addition, we thank Ann-Kathrin Dohme, Dr Thymian Bussemer (Group HR Innovation & Social Sustainability, K-SX) and Dr Holger Heyn (Prototype Protection, K-SK-3/1) for their invaluable support during the project.

Summary and key findings

The automotive industry is now facing the most radical transformation in its history. By the time this process is complete, whenever that may be, traditional automobile manufacturers will have become integrated hardware and software manufacturers and mobility service providers. This transformation has been triggered by the Paris Agreement and the 2030 Agenda for Sustainable Development. It is driven on the technology level by powertrain electrification and the end-to-end digitalisation of products and processes. Finally, it will also be endorsed and implemented by millions and millions of people worldwide. In Germany alone, the automotive industry directly employs 830,000 people. Added to this are around 1.3 million employees working in motor vehicle sales and servicing or for suppliers in other sectors that are linked to the automotive value chain. This corresponds to almost 5 percent of all domestic jobs¹. The industry's economic significance to Germany is huge. Scientific forecasts of the impact that electric mobility, digitalisation and their interaction are likely to have on future employment needs can provide the automotive industry and policymakers with important decision-making criteria that will help shape the forthcoming transition in a positive way and ensure that the transformation is a success on the economic, ecological and social level. In the past, such forecasts were based on global figures and statistical data from the industry as a whole. This allowed, at best, imprecise modelling. By contrast, the present study is based on concrete product- and process-related figures, planning data and expert assessments from a major automobile manufacturer. Following a request by its own Sustainability Council, the Volkswagen Group provided Fraunhofer IAO with this data and these findings. This transparent collaboration between industry and research resulted in a comprehensive, differentiated and practice-based forecast of future employment trends at Volkswagen, both quantitative and qualitative, over the coming decade.

Methodology

The collaboration with Volkswagen included some pioneering work on the part of Fraunhofer IAO. Specifically, Fraunhofer IAO adopted the methodology employed in the *ELAB 2.0* research project², which was limited to the modelling of employment effects within powertrain production, and applied this to the concrete situation at Volkswagen. On this basis, Fraunhofer developed an approach that systematically focused, in twin research strands, on the impact of both electric mobility and digitalisation on employment. To date, no other study has modelled and analysed the employment effects of these two factors, both individually and together.

The starting point for the present study was the year 2019. It investigated figures and plans for the period up to 2029 for the German operations of the Volkswagen brand and of Volkswagen Group Components, which produces parts for the whole of the Volkswagen Group. Despite being limited in geographical scope to Germany, the study's findings are also applicable globally to a certain degree, not least because the study analyses not merely one but rather a host of locations in Germany.

The research strand for electric mobility investigated the manufacture of conventional and electric vehicles plus their components on the basis of actual planned output volumes. It analysed the time required to manufacture each product and the average working time per employee. On this basis, it calculated the volume of work for each type of product and compared this on a temporal axis. The following were selected as representative reference vehicles: the Golf VIII and the ID.3. A similar approach was adopted for component manufacture, where a representative conventional powertrain (EA211 R4 1.5 L TSI Evo with 110 kW and DQ-200-7F transmission) and a representative electric powertrain (APP310 with MEB battery system) were selected. Based on planning data supplied by Volkswagen, the study

¹ Hagedorn et al. (2019): *Automobile Wertschöpfung 2030/2050*, Study for the Federal Ministry for Economic Affairs and Energy, 2019.

² Bauer et al. (2018): *ELAB 2.0 - Wirkung der Fahrzeugelektrifizierung auf die Beschäftigung am Standort Deutschland*, Fraunhofer IAO, 2018.

constructed a scenario in which the number of conventional vehicles falls by 42 percent up to 2029, while the number of electric vehicles increases by more than threefold over the same period. In this scenario, the production volume of electric vehicles will approach that of conventional vehicles by as early as 2025.

The research strand for digitalisation focused on two aspects, which are compared with one another: on the one hand, specific employee groups that Volkswagen has defined as cross-functional job clusters; on the other, technologies that essentially drive the processes of digital transformation, as selected for investigation by Fraunhofer IAO. A total of 39 job clusters were analysed. This analysis took the form of structured interviews with specialists and decision makers from each cluster, in which they were asked about the projected employment effects of 75 use cases resulting from digitalisation. These job clusters covered activities in the three administrative areas of procurement, finance and human resources; in the three innovation-driving areas of IT, technical development, and sales and marketing; and in the two especially labour-intensive areas of production and logistics. Fraunhofer IAO then supplemented the internal assessments from structured interviews with extensive analyses conducted from an external perspective. This involved the use of further research findings and other external sources, which were then incorporated in a final overall evaluation that compared the internal and external perspectives.

Key results: electric mobility

The job losses from the introduction of electric mobility are likely to be substantially lower in the area of vehicle manufacture than global studies have predicted. Although the study findings indicate that, on average, employment requirements in the area of vehicle manufacture will fall by 12 percent by the year 2029, these effects are only to a limited degree the result of product changes. Instead, they are primarily a reflection of planned output volumes and of improvements to factors that affect processes and production locations. Hence, the increase in electric mobility will directly affect employment in only a limited way, but it will act as a trigger and a catalyst for further improvements in a variety of areas.

With respect to component manufacture, however, labour requirements are 70 percent higher for the production of a conventional powertrain than for the production of a powertrain for an electric vehicle. Given the significant reduction in workload for the production of an electric powertrain, Volkswagen Group Components will face considerable pressure to change. Here, however, extensive measures are already underway to either safeguard jobs or ensure they are reduced in a socially acceptable manner. Any foreseeable employment effects can be cushioned by boosting output volumes and by shifting to the production of new components (e.g., battery cells). This qualitative shift in employment will necessitate, in particular, further training for employees in how to produce entirely new products.

Key results: digitalisation

In the ancillary areas of procurement, finance and human resources, digitalisation will effect a shift away from the current emphasis on reactive-analytic tasks towards increasingly proactive-predictive tasks. In the long term, digital transformation in these areas is primarily geared towards gains in efficiency. In the first instance, however, over the period up to 2030, it will bring about improvements in the quality of in-company services, which in turn will entail higher skills and expertise requirements. According to current forecasts, job reductions until 2030 will therefore be very moderate. Internal assessments project a shift in employment requirements for procurement of between 0 and minus 6 percent, for finance of between minus 1 and minus 2 percent, and for human resources of between plus 3 and minus 5 percent. From an external perspective, Fraunhofer IAO projects spreads of, respectively, 0 to minus 10 percent, minus 1 to minus 5 percent, and minus 1 to minus 7 percent. Overall, our assessment of the challenges facing administrative departments – in terms of their mechanisms of action, their strength and their qualitative effects – is similar to that of the Volkswagen experts we interviewed, except that we expect these effects to arise at an earlier date.

The areas of IT, technical development, and sales and marketing will bear a large share of the responsibility for the process of digital transformation within Volkswagen and for the integrated development of products and services. In response, Volkswagen has set up Car.Software organization (C.S O), a unit that brings together digital experts from specialist departments and group brands as well as holdings and subsidiaries. The aim is to develop a standard operating system for group vehicles as well as digital ecosystems, automated driving functions, assistance systems and customer-centric functions at dealerships. This realignment enhances collaboration on the development of a uniform software architecture for all vehicles. However, it does not resolve the challenges facing the aforementioned areas. Internal assessments project a shift in employment requirements for IT of between plus 2 and plus 3 percent, for sales and marketing of between 0 and plus 2 percent, and for technical development of between plus 2 and plus 7 percent. From an external perspective, Fraunhofer IAO projects spreads of, respectively, plus 3 to plus 6 percent, minus 2 to plus 5 percent, and plus 3 to plus 12 percent. Overall, our assessment of the employment effects in these three innovation-driving areas is similar to that of the Volkswagen experts we interviewed. However, we see the need for a more ambitious timetable for digital transformation and also anticipate a stronger impact on employment.

As the product mix shifts in favour of electric mobility, this will accelerate the introduction of digital technology in production and the automation of repetitive manual tasks. It will also bring the advent of automated, driverless transport vehicles in logistics. For this reason, the biggest negative employment effects over the coming decade are likely to be felt in those job clusters in the operative areas of production and logistics. For these job clusters, internal assessments project a reduction in employment of between minus 6 and minus 15 percent. From an external perspective, Fraunhofer IAO projects a spread of between minus 7 and minus 20 percent. Conversely, these areas are likely to see an increase in planning and administrative tasks needed to implement and operate this future automation technology. For this reason, both internal and external assessments project increased employment in production planning and logistics planning of up to 3 percent. Overall, our assessment of the employment effects in production and logistics is very similar to that of the Volkswagen experts. Any differences lie less in the assessment of the mechanisms of action than in the assessment of the time frame and the force of the impact that individual digital technologies will have on employment.

In all of the job clusters and areas investigated, digitalisation is set to trigger substantial qualitative changes to employment. In almost all of the areas investigated, this results in a substantial need for training and further training in terms of digital skills and expertise. Especially for areas in which employment growth is projected, it is unlikely that in-house training and personnel development will fully meet the increased need for digital skills and expertise. Existing HR instruments, both strategic and operational, must therefore be flanked by further efforts in the areas of recruitment and personnel development. Implementation of major IT projects such as the Digital Production Platform will result in extensive technical and organizational changes. These major projects will have employment effects across all areas of the company. Such effects are not likely, however, to take full effect until the 2030s.

Conclusions for the sector as a whole

The present study shows that for a major player in the automotive industry, faced with the transformation process of the 2020s, the real situation and outlook are far more complex than general, abstract model calculations would suggest. In particular, the study relativises the occasionally alarming findings of previous publications and refutes common scenarios describing exclusively negative employment effects. Using the example of Volkswagen, the study shows there is no uniform employment trend in the "transformation corridor" over the coming decade. Instead, there will be a complex, interconnected mixture of job creation, job upgrading and job cuts. The qualitative changes to work resulting from new technology are likely to prove more of a challenge than the quantitative reduction in the volume of work. Whereas forward planning can mitigate the social impact of quantitative changes to employment, the qualitative changes will require in some areas a massive increase in skills and expertise.

These findings, which are based on one automaker, are likely to be applicable to the whole of the automotive industry in Germany. Based on this example, the results of the present study also indicate that the anticipated qualitative employment effects resulting from digitalisation – not least with regard to the need for new skills and expertise in areas still unfamiliar to the industry – will necessitate a profound change in corporate culture. Given the projected growth in connected IT services – not only in vehicles themselves but also in the context of mobility ecosystems – the entire automotive industry is going to rely increasingly on the recruitment of employees with the ability to think and act in an interdisciplinary manner – and equipped with the corresponding qualifications and skills and expertise. If not, they will be unable to meet customer requirements and safeguard their own competitiveness. Such employees will expect an attractive working environment with flat and flexible forms of organisation – as already adopted by the major digital companies, which are now pushing to gain a foothold in the mobility market.

Based on the findings of the present study, the interaction between these two drivers of transformation – digitalisation and electric mobility – will increase the need for, and importance of, new cross-functional and cross-company collaboration, networks and partnerships. Value creation within a future mobility economy will occur within the context of an overall ecosystem, where a company's competitiveness will depend more than ever on effective cooperation with longstanding suppliers as well as with new market players. The advent of electrification and digitalisation will bring a reorganisation of value creation along the entire supply chain. It is vital to ensure that small and medium-sized enterprises (SMEs) do not fall victim to this process of reorganisation. Without their agility and innovation, the automotive industry would lose much of its dynamism and, with it, its future viability. Moreover, in the absence of greater trust across corporate boundaries – also with respect to data – the sector will sacrifice some of the huge potential offered by digital connectivity and recklessly surrender the field of mobility to new market players. The automotive sector must therefore trial and establish new forms of cooperation across the industry. It requires knowledge ecosystems that are more open and ensure a faster circulation of knowledge.

Equally vital to the future of the industry as a whole will be ever closer cross-company collaboration in the area of training and skills. Smaller suppliers and SMEs need to become better integrated within the OEMs' own programs of further training. The sector as a whole should come together in order to determine the currently lacking skills and expertise that will be specifically needed in the transformation process. The industry should agree on a "skills and expertise toolbox" required for this transformation. According to the findings of the present study, the relevant company departments are well placed to indicate which skills and expertise should go into this toolbox – even if, in response to the new technologies, there is still far too little open and concrete discussion of what is needed in terms of reorientation and reskilling beyond these specialist areas. Throughout the industry, there needs to be a much closer consideration, and stronger communication, of the depth to which this change process needs to penetrate.

Recommendations for industry and government

The current transformation towards a mobility economy creates huge challenges for the German automotive industry. This transformation is of major economic significance and will require bold and resolute decision-making on the part of the industry. Policymakers, researchers and members of general public can and must be involved here. They can do this by investigating and reflecting upon – in depth and in advance – these future technologies and the employment trends they will bring. The sooner work begins to shape the future employment situation in 2030, the greater the security and the higher the quality of the jobs in the automotive industry in 10 years' time. The findings of the present study, and the methodology it employs, show that it is possible to base this process upon precise analyses. In its approach, this study marks the beginning of a new and transparent collaboration between industry and research. Its findings clearly show that the transformation now facing the automotive industry not only presents a

historic challenge but also offers a historic opportunity: the opportunity to start this process now and to use it wisely for the benefit of all stakeholders. In this respect, the present study also aims to encourage suppliers and SMEs to systematically focus on future job trends and to tap into the positive potential of electrification and digitalisation.

In a world marked by increasing volatility, uncertainty, complexity and ambiguity, we will also require innovative forms of collaboration between industry, research and government so as to safeguard jobs in the automotive industry. One possible form of cooperation, as proposed by this study, is to create a national technology and transformation agency, which would be neutral and perhaps funded, wholly or partially, by public money. In particular, this would support SMEs from the supply sector, whose business is acutely threatened by the transition to electric mobility, and help them tap into new areas of value creation and employment. Another possible form, derived indirectly from the findings of the present study, would be a national transformation centre for sustainable employment. This would not only strengthen industry cooperation along the value chain but also ease forecast-based navigation through the transformation process and help establish an efficient system of further training. In particular, it is vitally important to determine in more detail which measures industry and government should now develop and adopt in the areas of education, training and employment, so that it then becomes possible to exploit the qualitative changes brought about by the transformation and to convert these into positive employment effects.

Building on the findings of the present study, there is now a need for further research in a variety of areas.

- Identification and quantification of the concrete **future skills and expertise** required by individual companies and within the automotive ecosystem as a whole; derived from this, a determination of the requisite training and skills requirements.
- Investigation of a **framework to promote innovation** and establish automotive clusters of excellence in the fields of electric mobility and digitally supported mobility solutions.
- Analysis of the role of suppliers in preserving the German automotive industry's innovative strength as well as ideas for how to **shape the partnership between suppliers and OEMs** in terms of how value added should be shared in the production of future components.
- Investigation of **corporate policy options** and **instruments** for overcoming the challenges resulting from workforce transformation in the overall context of an automotive group's various brands and plants.
- Development of **alternative transformation scenarios** based on different assumptions to those used for the real base scenario of the present study. This will make it possible to project and therefore rapidly anticipate any unexpected developments in transformation.

Based on the projected research outlined above, it would be possible to derive concrete transformation measures that would then enable automotive companies to react rapidly to sudden changes in their original planning assumptions. The corona pandemic offers a graphic illustration of just how important this can be for a sector in such a dynamic and vulnerable situation as the automotive industry.

