
Editorial

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1 Introduction: radical transformation in the automotive industry towards a new mobility

‘Managing the new mobility’ is more important today than ever, since the automotive industry is undergoing the most sweeping transformation of all times: added to the changes on the global markets and in the competitive landscape since the turn of the millennium are new global environmental trends, particularly the further differentiation in demand for mobility, vehicle power units and, as a result of digitalisation, the pressure to reduce the capital employed (Proff, 2019, 2020). On top of that there is the coronavirus crisis, which not only has to be mastered, but also further increases the need for multinational automotive companies to redesign themselves (cf. Couchman et al., 2020).

Since the start of the millennium, traditional automotive companies have faced challenges from the increasing differentiation in global automotive markets, further amplified today by new trade barriers and the UK’s exit from the EU as well as new international competitors from outside the industry such as Geely, Google, Tesla and Uber. They have responded by further developing their strategies and the steering of their foreign subsidiaries (ibid.): automotive companies are progressing from strategies to business models in their business units (cf., e.g., Proff et al., 2014; Proff and Fojcik, 2015) and are transitioning from transnational and therefore largely homogeneous steering of their foreign subsidiaries to more country-specific and therefore heterogeneous steering (cf. Proff, 2018).

The challenges are increasing with the increased global differentiation in the demand for mobility, the start of the transition to electric mobility, the increasing digitalisation and development of autonomous vehicles and the growing global pressure from investors to reduce the capital employed (cf. Proff 2019, and Figure 1).

The four environmental trends can be explained by different factors (cf. Proff 2019, 2020).

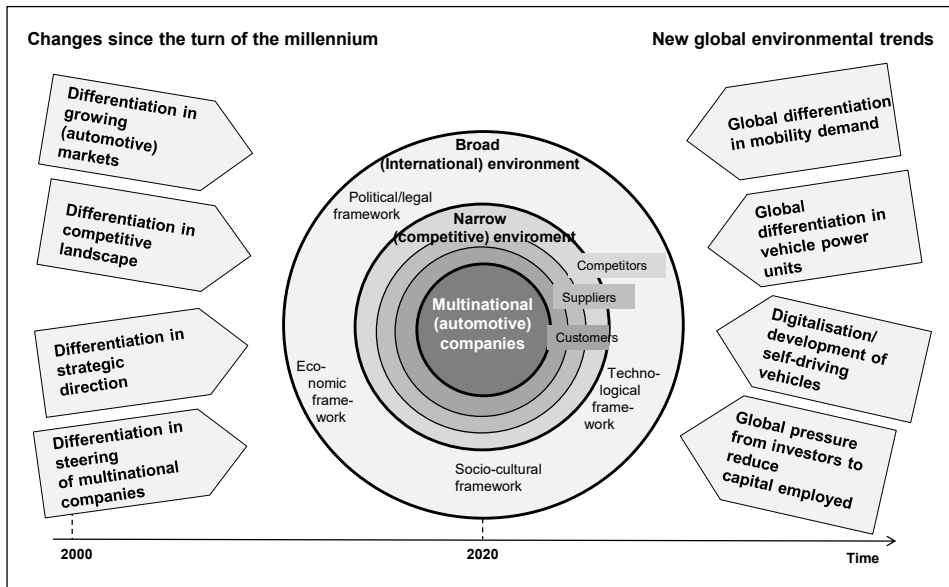
- 1 The global differentiation in the demand for mobility describes transnational and, simultaneously, increasingly country-specific changes in the socio-cultural environment, e.g., different lifestyles depending on age and income. It is partly explained by the theory of inter-temporal consumer behaviour, which assumes that households’ consumer spending is carried out in such a way as to keep the marginal

utility of income over the life cycle (age) constant (cf. Blundell et al., 1994). This is because young people cover their basic needs initially, then their additional needs and less rational needs later in life. Income and consumption curves, and also borrowing and savings, are therefore unevenly distributed over the life cycle (cf. Miles, 1997). Shopping baskets which differ according to age, income and living environment, and thus also according to the use of public and private transport, vehicle power units and transport services, can be derived from the different intertemporal needs of households.

- 2 The differentiation of vehicle power units into new basic technologies (purely battery-electric drives and fuel cells) is increasing globally, but differs from country to country in the extent to which the internal combustion engine is losing importance as a result of CO₂ limits and impending driving prohibitions, batteries and fuel cells are improving, the infrastructure is being developed and the energy transition is progressing [cf. Proff, (2019), p.135]. The differentiation in vehicle power units can be accelerated by political interventions: by developing new markets for new drive technologies (market creation), for example with bonuses for the purchase of electric vehicles or by imposing emission limits to restrict traditional markets for internal combustion engines [market devaluation, cf., e.g., Varian, (2014), pp.663–685]. Economic policy interventions are justified to promote positive and avoid negative external effects.
- 3 Digitalisation enables the gathering, storage, analysis and transfer of large data volumes and is transforming the entire automotive industry (cf. Covarrubias, 2018). The opportunities that lie in digitalisation can be argued from the economic point of view by explanations of economic interdependency and coordination. According to these, digitalisation is enabling and driving changes in business activity worldwide, that is, further differentiation in processes, offerings (products and services) and business models. Digitalisation first creates the technical prerequisites for an improvement and, above all, a radical change in processes (cf. Proff and Knobbe in this special issue) by standardising interfaces between the economic activities along the value chain. As a result, interdependencies between these activities and therefore transaction costs for internal and external coordination are reduced (cf. Haigu and Wright, 2015), which leads to an improvement in the decoupling of value-creating activities and makes outsourcing to suppliers. Goal conflicts between efficiency (large unit volumes) and flexibility (variability of product or service production) can be reduced even further by digitalisation than by platforms and modularisation. In addition, new possibilities of cooperation in innovative networks ('structural ecosystems', Adner, 2017, see also Donada and Attias, 2015) are possible that enable innovative customer solutions and business models.
- 4 There is global pressure to reduce capital employed ('light asset' approach, cf. Kachaner and Whybrew, 2014) in order to increase the profitability of traditional automotive companies, which are undervalued on the capital markets, to lower their debt, and reduce risks in times of major uncertainty caused by the other environmental trends. This is explained by capital market models (cf., e.g., Blanchard and Illing, 2017), because companies become leaner, faster and more flexible as a result and achieve significantly higher profits (Kachaner and Whybrew, 2014).

The “global shift of the coronavirus pandemic swiftly emerged as the single biggest risk factor facing the auto industry for many years” [Couchman et al., (2020), p.5]. Although “forecasting in this environment is hard” (ibid., p.7), the coronavirus crisis will increase the pressure on multinational automotive companies to respond to the global differentiation in mobility demand and vehicle power units, and to the opportunities but also the risks of digitalisation and at the same time to reduce the capital employed, that is, to redesign their strategies and their steering.

Figure 1 Transformation in the automotive industry due to global environmental trends



Source: Based on Proff (2020) with reference to Proff (2019, pp.26, 109)

2 Redesign of the strategies and steering of multinational automotive companies as a response to the challenges since the turn of the millennium

Since the start of the millennium, automotive companies have been adapting,

- their strategies (Section 2.1)
- the steering of their foreign subsidiaries to the changes (Section 2.2).

However, the global environmental trends demand a more extensive redesign of strategies and steering.

2.1 Redesign of the strategies of multinational automotive companies

Since the start of the millennium, automotive companies have been developing strategies in their business units, as decisions on resource allocation and competitive advantages

(cf., e.g., Aaker and Moorman, 2017), i.e., strategies of cost leadership, differentiation, cost-minimal differentiation and innovation, in many or a few market segments, into business models (cf. Krommes and Schmidt, 2017). They now additionally decide explicitly on:

- the value architecture (i.e., between the integration or in-house production of value added, orchestration of the value added or value creation by suppliers in a network and specialisation in individual value-adding activities)
- the value proposition (i.e., not only between the product, service and brand proposition, but also via an individualisation, integration and interaction proposition)
- the profit model (cf., e.g., Proff et al., 2014 and similarly Markides, 2015).

As a result of the four global environmental trends with long-term, discontinuous changes in the transition to new basic technologies for electric mobility, and because of digitalisation (Figure 1), automotive companies not only need to (1) continuously improve their traditional business models but also to (2) develop new, innovative business models. The two tasks are mutually supportive, because new, innovative business models can only be financed by improving traditional business models, and these new business models, in turn, may have positive (image) effects on traditional business models. However, the two tasks are also in conflict, because efficiency from improving traditional products and services and traditional business models cannot be maximised simultaneously with flexibility for new products and services and business models. Since flexibility arising from capacity reserves incurs costs through event buffers, which hamper the use of a minimum cost combination in production, a goal conflict arises. A conflict of this nature between variables or parameters which are also mutually dependent [cf. Fojcik, (2015), p.19] is described as a paradox (e.g., Smith and Lewis, 2011) of ambidexterity and requires (3) ambidextrous management (cf., e.g., Raisch and Birkinshaw, 2008; Simsek et al., 2009) of interdependent and simultaneously conflicting activities. Automotive companies should align themselves with this and dynamically manage the transition from the old to the new technology (cf. Raisch and Tushman, 2016).

2.2 Redesign of the steering of multinational automotive companies

Since the turn of the millennium, automotive companies have been reacting to the differentiation in the growing automobile markets and in the competitive landscape by, among other things, making the steering of foreign subsidiaries, which had long been transnational and centralised, more individual, country-specific and therefore more heterogeneous. This can be explained mainly by applying agency theory (in the broader sense) (cf., e.g., Ambos et al., 2016), which considers the relationship between multiple principals (managers at board level and in business and functional units at the parent company) and agents (managers of subsidiaries). The subsidiaries' managers accumulate knowledge in view of the global differentiation in the automotive markets and try to defend it from the parent company's management. They are thus fighting for country-specific steering – partly against the interests of the parent company, which particularly in capital-intensive industries makes efforts to achieve transnational economies of scale and scope. This leads to goal conflicts between the interests of the parent company and those of the subsidiaries.

The global environmental trends (Figure 1) amplify the foreign subsidiaries' demand for country-specific steering and the parent company's striving for transnational steering to achieve economies of scope and scale, and therefore also strengthen the goal conflicts in steering.

These appear irresolvable on the superordinate level. It is therefore important in redesigning the steering of foreign subsidiaries to seek conflict-solving mechanisms. The thinking on goal conflicts in economic policy (cf., e.g., Knips, 1970) can be applied here. According to this thinking, such goal conflicts, which cannot be resolved on a superordinate level, should be narrowed down to the level of sub-goals and resolved there (cf. Mehler, 1970). Sub-goals of this nature are, for example, individual steering instruments such as good compliance management, the definition of transfer prices, the creation of centres of excellence and, in particular, shared cultural values [cf., e.g., Proff, (2018, 2019), p.92]. Amenable goal conflicts can either be resolved on a country-specific basis in negotiations, e.g., through transfer prices, or by competition between subsidiaries, e.g., concerning the creation of Centres of Excellence, or on a transnational basis within the hierarchy, e.g., by the introduction of good compliance management. Although insuperable differences between the parent company and foreign subsidiaries cannot be resolved, they can be smoothed out by mediation, i.e., by narrowing down further to central aspects, e.g., shared core values in the conflict about shared cultural values.

3 Approaches to managing the new mobility

Initial studies show that multinational German automotive companies, both manufacturers and suppliers, have not yet reacted adequately to the long-term, discontinuous changes caused by the global environmental trends, particularly the transformation to new vehicle power units and digitalisation (cf. Proff, 2019).

This special issue of the *International Journal of Automotive Technology and Management (IJATM)* therefore contains five papers which offer farther-reaching approaches to 'managing the new mobility' in times of radical transformation. Four of these papers are revised and (in some cases greatly) extended versions of papers presented at the 11th Wissenschaftsforum Mobilität at the University of Duisburg-Essen under the general theme of 'new dimensions of mobility systems', 23 May, organised by the Chair of General Business Administration & International Automotive Management (cf. wissenschaftsforum.unidue.de). One of the authors of the fifth paper has also already presented research results at the Wissenschaftsforum Mobilität.

The Wissenschaftsforum Mobilität is held in Duisburg every year. Following the discussion of digital transformation in mobility at the 9th Wissenschaftsforum in 2017, a theme which not only influences individual processes, products/services and business models but also enables digital value creation systems, and the discussion in 2018 of the transition from the old (automotive) mobility to a new mobility, the 2019 event took the theme of 'new dimensions of mobility systems' as its framework. The plenary speeches, presentations and poster contributions centred not only on change due to new power units and digitalisation, but also on new dimensions of mobility, e.g., underground transport capsules and air taxis.

The visions of mobility are multi-dimensional and interdisciplinary. Some still sound like science fiction. The goal of the 11th Wissenschaftsforum was therefore to discuss how fiction can become reality with the aid of science. The forum spanned a wide range, from new dimensions of automobile management and mobility management through new technical dimensions of mobility, new dimensions of urban mobility concepts, current developments in the digitalisation of mobility to new dimensions of customer solutions.

The five papers selected for this special issue look at new dimensions of automobile and mobility management from the perspective of management science.

- 1 They consider individual global environmental trends the differentiation in demand for mobility, the differentiation in vehicle power units and differentiation due to digitalisation.
- 2 They offer levers for managing the new mobility: simulating the future (technological) development of the environment, simulating future customer behaviour, contrasting the customers' intention to use with corporate reputation, activating dynamic capabilities and considering the influence of national culture on the implementation of ambidexterity in transitioning to new technologies (Figure 2).

Figure 2 Approaches to managing the new mobility

(1) Consideration of global environmental trends	(2) Management of new mobility	a) Simulation of future (technological) environmental development	b) Simulation of future customer behaviour	c) Customers' intention to use v. corporate reputation	d) Activation of dynamic capabilities	e) Consideration of influence of national culture on implementation of ambidexterity
a) Differentiation in demand for mobility				Grotenhermen et al.		
b) Differentiation in vehicle power units		Hüls et al.				Müller/Stephan
c) Differentiation through digitalisation and through autonomous driving			Fournier et al.		Knobbe/Proff	

Christoph Hüls, Christian Thies, Karsten Kieckhäfer and Thomas S. Spengler, in their paper ‘Limiting CO₂ fleet emissions in the automotive industry – a portfolio planning approach’ simulate the differentiation in vehicle power units (1b in Figure 2) in the transition to electric mobility as a future development in the technological environment (2a in Figure 2), induced by more stringent CO₂ regulations. For this purpose, they develop a portfolio planning approach which leads to cycle plans for vehicle project planning. That is, they simulate which power units will be offered when in which vehicles.

Guy Fournier, Adrian Boos, Ralf Wörner, Ines Jaroudi, Inna Morozova and Eliane Horschutz Nemoto, in their paper ‘Substituting individual mobility by mobility on demand using autonomous vehicles – a sustainable assessment simulation of Berlin and Stuttgart’ look at the simulation of future mobility behaviour and thus customer behaviour (2b in Figure 2) in the deployment of autonomous vehicles (1c in Figure 2) with electric power (1b in Figure 2) units in the sharing economy. They perform an analysis in the cities of Berlin and Stuttgart, for example, of the potential reduction in

CO₂, the amount by which congestion can be reduced, how much parking space can be saved, and how costs will fall.

Jan-Gerrit Grotenhermen, Sven-Olaf Gerdt and Gerhard Schewe look in their paper ‘Comparing customer perceptions of potential autonomous vehicle manufacturers: an analysis of the relationship between corporate reputation and intention to use’ (2c in Figure 2) at autonomous driving (1c in Figure 2), and compare the customers’ intention to use, i.e., the customer-side acceptance factors [market pull, Figure 1(a)] with the manufacturers’ communication (technology push). How uncertainty is dealt with plays a major role here, since customers are not yet familiar with self-driving vehicles (they are ‘really new products’). Additional major factors are past adverse events and the type of the potential manufacturer (traditional automotive manufacturer, technology company working on AV-related technologies as possible new entrants to the automotive market or mobility start-ups).

Florian Knobbe and Heike Proff examine ‘Dynamic capabilities in the automotive industry under digitalisation – a quantitative study in the automotive supplier industry’ (1c and 2d in Figure 2). They demonstrate that it is possible to distinguish different patterns in the activation of dynamic capabilities to change operational capabilities and business activities (single process, products, business models and whole value systems) during long-term discontinuous changes under digitalisation. The quantitative study at German automotive suppliers offers indications that companies’ fall into five distinct patterns of activating and utilising dynamic capabilities under digitalisation, and that this results in distinct leverage points in the business activities.

In their paper, Lucas A. Müller and Michael Stephan consider the issue of ‘To separate or to integrate? The normative effect of national culture on organisational ambidexterity of automotive OEMs in transition towards electric mobility’ (2e and 1b in Figure 2). The central focus is on the question of whether Geert Hofstede’s culture dimensions, for example uncertainty avoidance, influence the decision on whether the traditional and the new business are separated or integrated.

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