
Editorial

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This year, the special number of *IJATM* is, dedicated to the international conference of Gerpisa in Puebla (Mexico)¹, marks the transition between two programs of research. As we stressed one year ago (Pardi and Calabrese, 2016), the previous international program on the structuring and restructuring processes of the global automotive industry has left us with an unresolved riddle.

We expected radical transformations to take place: such as the rapid diffusion of battery electric vehicles (BEVs) in China and elsewhere in the world; the establishment of 'new green deals' based on the new mobility paradigm in restructuring countries like the USA, EU15 and Japan but also in emergent countries; the de-globalisation of the value chains due to more dedicated products to emerging markets; and, for all these reasons, the entrance of new players from the ICT and service sector contesting the

traditional OEM's hegemony on the automotive sector. But we have rather witnessed the re-establishment of the status quo after the great crisis.

Markets have recovered mostly on the same bases as before. Even carmakers that were at the brink of bankruptcy (PSA), or even filed for bankruptcy (GM and Chrysler), are 'back in the race'.² Electric cars in general and BEV in particular, despite very significant governments' subsidies to promote their diffusion, remain at best niche products. The crucial Chinese market has become an Eldorado for conventional ICE global cars. New players from ICT either have stroke alliances with incumbent OEMs (i.e., Google with Ford) or face cumulative losses that clearly overstep the growth of their sales (Tesla, Uber, Lyft, etc.): none has disrupted so far the traditional business of OEMs or appears to be able to do so in the near or distant future (Smitka and Warrian, 2016).

The same conclusion can be reached concerning new mobility services: they do not disrupt traditional businesses (their impact on sales is non-existent) and, even with important public subsidies (i.e., Autolib), they are far from profitable. Finally, global players have increased their hold on the production and sale of cars worldwide as regional integration, global value chains and foreign direct investments have all progressed significantly during the last ten years.

Clearly, our hypothesis (Jullien and Pardi, 2013) of fast disrupting changes proved wrong. But what exactly did we get wrong? Were we wrong about the fundamental nature of the on-going transformation, or were we wrong about its tempo? In other words, should we now expect the status quo to hold, or things are finally about to change for good?

The tentative answers one could give to this double question depend very much from which standpoint he looks at it. If one looks at the 91 millions of cars produced worldwide in 2015, an all time record, it would be difficult to see many traces of any on-going or upcoming revolution. Indeed, never before in the history of mankind were produced so many conventional, ICE propelled, privately owned and driven cars by the traditional players of the automotive industry. And we know that cars are made to last, which means that what is sold today will structure the mobility systems in each country for at least the next 15 years to come. But if one looks at the recent forecasts made by several authoritative agencies and at the communication from both silicon valleys' companies and automotive OEMs, he could easily assume that we are (again) on the verge of a series of dramatic transformations that will rapidly (in much less than 15 years) establish the electric, shared and autonomous vehicle produced by highly automated flexible factories as the norm.

In order to establish the odds of such divergent scenarios, our new international program of research (2016–2020), 'The new frontiers of the global automotive industry', aims at better characterising the dynamics of all these 'expected' revolutions: what are the economic, technological, institutional, political and social conditions that would allow these radical changes to take place and diffuse? Conversely, why the existing and still growing traditional automotive world of production and usage can prove more resilient than 'expected'?

The question is not really if things will change, as it is clear for any observer that many things will substantially change in the years to come due to the introduction of new digital technologies in cars and mobility systems and to the hardening of environmental regulations, but how, at which pace and with which consequences. In other words, will we be looking at 'disruptive' transformations ('revolutions') or at 'continuous' changes ('evolutions') of the existing paradigm?

What we have learned from our previous international program is that even when radical changes are promoted by several new and/or well established companies, supported by important governments' subsidies and stringent regulations, and acknowledged as 'inevitable' by incumbent players, as it was the case for instance for the French 2009 'Electric plan' or the 15 billion euros 2009 Chinese plan to support electric vehicle development, yet things may not change at all or very little. Nonetheless, it is also important to remember that one of the structural conditions that we had identified as the driving force behind these expected changes – the growing contradiction between the fast development of emerging countries and the rarefaction of fossil resources leading to higher oil prices (Jullien and Pardi, 2013; Freyssenet, 2011) – has suddenly and very unexpectedly disappeared since 2011.³ In suggesting therefore that the status quo, intended as a relatively slow, cumulative and evolutionary transition towards new technologies under the control of incumbent automotive players, may eventually prevail, we could be wrong again if, for any reason, oil prices should start to rise quickly. Furthermore, the idea of 'status quo' has to be understood here as opposed to the idea of 'revolution' as it is promoted by Silicon Valley's actors and gurus, and does not imply that the automotive sector is not transforming in many important ways. In particular, the reconfiguration of the geopolitics of the automotive production and R&D that we had put at the core of our previous international program keeps getting wider and deeper, and this will clearly continue to affect the way in which the sector will evolve under the influence of these new technological forces.

The five contributions to this special number illustrate well the transition between the two international programs, and contribute nicely to both lines of research.

Concerning the 'revolution' debate, the 'architectural analysis' of green vehicles developed by Takahiro Fujimoto provides a very useful framework to organise our collective research on the development of new powertrains' technologies. The paper compares the product architectures of all the different types of green vehicles, including advanced ICEs, parallel hybrids, BEVs, range extenders and fuel cell vehicles, along a continuum that goes from the most modular architecture to the most integral one. It argues that none of these types of vehicles 'seems to be able to take over the world's automobile market in the next few decades', and it forecasts a rather fragmented landscape in which each technology will occupy a market niche. It shows in particular that from a product architecture perspective, the BEV, which is often thought as a rather modular vehicle with strong disruptive properties, is in fact a quite integral product. Indeed, in order to solve the interlinked problems of low autonomy, long recharging time and battery cost, size and weight, a very coordinated intensive and sustained engineering effort will be required on several different critical functions and critical components. This suggests that incumbent players that have cumulative built in-house, over a long period of time, these hard to transfer capacities, rather than newcomers from other sectors using markets as coordination devices, will have the resources and the know-how to solve all these problems. Besides, this also explains why a company like Tesla is becoming more and more integrated in order to improve the performances and cost of its BEVs, and why this translates in heavier and heavier cost penalties due to low economies of scale and lack of efficiency in manufacturing.

This is also the issue discussed by Sergio Tadeu Gonçalves Muniz and Bruce M. Belzowski in this special number, whose paper compares the advantages and drawbacks of adapted electric platforms versus new electric platforms. The paper relies

on the case studies of the C and C/D platforms of Ford, that have been adapted to produce electric vehicles on the same lines as conventional ICEs, and the forthcoming MEB platform of Volkswagen that will be exclusively dedicated to the production of BEVs. Muniz and Belzowski argue that the reason why new electric platforms, as the MEB, remain by far the exception in the industry, while adapted electric platforms represent the norm, is precisely for costs reasons. By sharing the same platforms, and therefore, the same chassis and components of conventional ICEs models, BEVs take advantage of economies of scale in order to achieve reasonable costs of production. BEVs remain of course significantly more expensive than comparable ICEs cars due to the cost of batteries and low volumes for dedicated parts, but carmakers can sell them without facing important losses. However, such a cost-wise solution impacts the performance of the vehicles: due to the rigidities of the existing platforms important compromises must be made to deal with the problems of range, recharging time and battery cost that handicap the BEVs against alternative green vehicles. Under these conditions, it is difficult to forecast the emergence of mass markets for BEVs. By contrast, new-dedicated electric platforms can provide the conditions to solve at least part of these problems, but they come initially with huge cost penalties (i.e., Tesla). Which means that they can only be viable if the performance's improvements make it possible to sustain in a relatively short period of time sales of at least, let us say, 1 million cars per year, otherwise, the drawback of significant losses per vehicle would eventually undermine all the advantages of improved performances.

The remaining three papers of this special number focus on the 'structuring/restructuring' line of research and further develop our previous international program along three complementary themes: industrial and trade policies, workplace agency and training.

Gregory Mordue and Brendan Sweeney develop the intriguing concept of 'commodification of automotive assembly' to make sense of the weakening capacity of the Canadian Government to protect and expand its automotive sector. The concept corresponds to the growing ubiquitous nature of high quality assembly which dramatically reduces the bargaining power of high wages countries to obtain new investments and to improve wages and working conditions. In the case of Canada, the regional integration in NAFTA, in 1994, and the ban of the protective 1965 'Auto pact' by the WTO, in 2001, have exposed the foreign controlled national automotive sector to direct competition from Mexico, where the capital intensity of production and the quality of workers are now comparable to those of Canada and of the USA. Under these conditions, the Canadian Government and trade unions are stuck on what has been also called concession bargaining: subsidies, fiscal advantages, lower wages, work intensification, etc. are given just in order to keep the existing industrial base and production. Given the recent protective measures enacted by the Trump's administration to shield the US automotive sector from NAFTA, the 'cautionary tale' of the Canadian 'race to the bottom' has several important implications for our future research.

Frido Wenten, however, suggests in his paper on the Chinese and Mexican subsidiaries of a major German OEM that there still is a glitch in the globalisation machine producing automotive assembly 'commodification' and this glitch is workers' agency. In Mexico, despite a dramatic conflict in 1992, during which the German OEM had fired the whole workforce and permanently dismissed over 1,000 activists, management has been struggling to implement a meritocratic wage system, and 25 years later is still dealing with 'persistent discontent and pressure from below'. In China, due to

the absence of independent unions, the growing discontent from temporary and dispatched workers takes other forms: reduction of efforts, dysfunctional quality circles due to lack of participation, and exit strategies of migrant workers who simply go back to their land. Building on the two case studies, Wenten goes on arguing that even in countries where the balance of power appears as clearly unfavourable to workers, the capacity of OEMs of obtaining from their employees the required implication at work cannot be assumed as given, and still depends on complex social and political processes.

As far as the production is becoming in these countries more and more complex and high value added, the capacity of training and retaining core-qualified workers appears as a crucial dimension in this agency process. Judith Wiemann focuses on the case of three training schemes developed in Puebla by three German companies (Volkswagen, Audi and Shuler-Cedual) to explore more in detail this dimension. What is at stake here is the export of the German model of vocational training in Mexico. The comparative analysis shows interesting differences between the three training schemes that reflect historical processes (the Volkswagen scheme started much earlier than the other two), specific corporate strategies (Shuler sells training to other firms while Volkswagen and Audi only focus on their own needs) and state's support (the Audi program is sponsored by the central government in cooperation with the *Universidad Tecnológica de Puebla*). This contrasted picture suggests that the integration between the very specific recruiting and training needs of big international OEMs, on the one hand, and the development of vocational training for skilled and unskilled Mexican workers (the Mexican model of dual formation), is far from obvious. While Wiemann suggests keeping them separate, this is also problematic as far as the exported German vocational schemes attract not only very significant subsidies but also the best workers available.

Judith Wiemann is the winner of the 2016 Young Author Prize of Gerpisa. Greigory Mordue was amongst the contenders and together with Frido Wenten, they represent a new generation of Gerpisa researchers. Their contributions to this special number are of great quality and focus on issues (industrial policies, workers' agency, productive models' hybridisation, recruitment and training, employment relationship) that have always been central in our understanding of the transformations of the automotive sector. At a time when many expect 'revolutions', it is a useful reminder of the pertinence and resilience of classic research topics.

References

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Notes

- 1 The GERPISA conference was mainly supported by Consejo Nacional de Ciencia y Tecnología de Mexico (CONACYT), El Colegio de la Frontera Norte (COLEF) and hosted by the Campus Tecnológico de Monterrey in Puebla. We greatly thank the local organisers and in particular professor Jorge Carrillo and all the colleagues of Red Innovación y Trabajo en la Industria Automotriz Mexicana (ITIAM).
- 2 «Back in the race» is the name of the recovery plan launched by PSA in 2014.
- 3 Oil prices have fallen from over 100\$ the barrel in 2011 to less than 40\$ in 2014.