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The Next Generation Automobile Industry as a Creative Industry

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Abstract: *The aim of this paper is to describe the recent transformation of the automobile industry from a manufacturing industry to include aspects of the service and creative industries. Firstly, it reviews the recent trend of the automobile industry as a service industry. Secondly, it discusses the automobile industry's move toward the creative industries. It examines these two trends, mostly based on the next-generation automobile industry in Japan. Finally, it discusses the implications of the above transformation of the automobile industry on academic studies of the creative industries, and argues for what it calls a strong programme in creative industries studies. It also provides a provisional note on government policies in the era of the next-generation automobile industry.*

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1. Introduction

At CES 2019, global automobile firms showcased their most cutting-edge technology on various fronts.[1] For example, Daimler announced that it would invest €500 million in the development of level 4 autonomous driving trucks (Daimler, 2019). China's Byton announced that, by the end of 2019, it would mass-produce its electric vehicle M-Byte, which has level 3 autonomous driving capability (Liu, 2019). At CES 2018, Toyota debuted its e-Palette concept, 'a next generation EV specifically for MaaS that makes use of electrified, connected, automatic driving technology' (WOW, 2018). At CES 2019, Toyota continued to showcase its autonomous driving technologies by presenting the TRI-P4, which combines its 'guardian' (advanced driving assisting system) and 'chauffeur' (autonomous driving) systems (Toyota, 2019). Ford demonstrated its cellular vehicle-to-everything (C-V2X) technology at CES 2019, which, for example, 'can be used by cars to negotiate rights of way in four-way intersections without the help of traffic lights or stop signs' (Reichert, 2019).

In sum, almost all the automobile manufacturers, as well as tech firms producing relevant technologies, are focused on coming up with the next generation of automobiles – characterised by the Connected, Autonomous, Shared and Services, and Electric (CASE) and Mobility as a Service (MaaS) keywords. CASE is the mid- to long-term strategy of Mercedes-Benz of the German automaker Daimler. The strategy was first presented at the Paris Motor Show in 2016 and continues until 2020. In the words of Dieter Zetsche, the chair of Daimler AG's management board:

[1] CES – formerly an acronym for Consumer Electronic Show – is one of the world's largest trade shows for the consumer electronics industry, held annually in Las Vegas.

> Connected, Autonomous, Shared, Electric: Each of these has the power to turn our entire industry upside down. But the true revolution is in combining them in a comprehensive package. (Daimler, 2016)

Although the term was originally presented by one firm – Daimler – the CASE trend is shared by auto manufacturers worldwide and has become one of the most important keywords defining the next-generation automobile industry.

Another keyword of the present-day automobile industry is MaaS, which represents the trend of moving from personally owned cars to modes of transportation that are consumed as a service. The term focuses on the 'S' of CASE, but also presumes the realisation of autonomous driving technology and electric vehicles, which are enabled by digital connectivity.

A definitional caveat is in order at this point. In some cases, next-generation automobiles are more narrowly defined as vehicles that reduce carbon dioxide emissions. For example, Japan's Ministry of Economy, Trade and Industry (METI) announced its Next Generation Vehicle Strategy in 2010, which aims at reducing carbon dioxide emissions to tackle global warming and the limited supply of natural resources, especially oil (Research Committee on the Next Generation Vehicle Strategy, 2010). The strategy included hybrid, electric, plug-in hybrid, fuel cell, clean diesel, compressed natural gas, and other environmentally friendly vehicles as the next-generation vehicles. This definition partly overlaps with CASE and MaaS, as it includes electric vehicles and may suggest reducing the number of vehicles owned individually and the move toward shared vehicles to reduce environmental impacts. This narrower definition has its own merits in that it allows us to focus on the environmental impact of automobiles. To grasp

the increasingly complex contemporary and future trends of the automobile industry more clearly, however, we need to define the next-generation automobile industry more comprehensively. Hence, this paper defines it as the automobile industry represented by the keywords CASE and MaaS, rather than narrowly defining it as concerned with fuel efficiency and environmental friendliness.

The structure of the paper is as follows. The second section examines the automobile industry as a service industry, discussing recent trends in MaaS. It describes two cases of MaaS-oriented vehicles – Toyota's e-Palette concept and Nissan's Easy Ride. The third section presents evidence for this paper's contention that the automobile industry, in particular the next-generation automobile industry, can be analysed as a creative industry. This includes discussion of firms such as NVIDIA, which is involved in both automobile industrial and gaming technologies. It also introduces the example of automobile industrial engineers' use of gaming software to simulate autonomous driving in a virtual setting. In addition, it examines efforts by non-automobile manufacturers to be involved in the automobile industry, such as Sony's experimentation with the New Concept Cart SC-1, in the age of next-generation automobiles. The fourth section concludes the paper by discussing the analytical implications of seeing the automobile industry as a creative industry. It argues for a 'strong programme' in creative industries studies. The same section provides a provisional note on government policies in the era of the next-generation automobile industry.

2. Automobile Industry as a Service Industry

In both the keywords that characterise the next-generation automobile industry – CASE and MaaS – the 'S' for service is highlighted as the trend that shapes the future of the industry. Let us introduce empirical examples of the automobile industry as a service industry from two Japanese auto manufacturers, Toyota and Nissan.

2.1 Toyota's E-Palette Concept

The first example is Toyota's e-Palette Concept, which was presented at CES 2018 in Las Vegas, Nevada. According to the Toyota President Akio Toyoda:

> The automobile industry is clearly amidst its most dramatic period of change as technologies like electrification, connected and automated driving are making significant progress. Toyota remains committed to making ever better cars. Just as important, we are developing *mobility solutions* to help everyone enjoy their lives, and we are doing our part to create an ever-better society for the next 100 years and beyond. This announcement marks a major step forward in our evolution towards sustainable mobility, demonstrating our continued expansion beyond traditional cars and trucks to the creation of new values including *services for customers*. (Toyota, 2018a; emphasis added)

As the words above indicate, Toyota – Japan's largest automobile manufacturing firm – is expanding to include mobility services as its key component.

E-Palette is 'a fully-automated, next generation battery electric vehicle (BEV) designed to be scalable and customizable for a range of Mobility as a Service (MaaS) businesses' (Toyota, 2018a). The vehicle is enabled by the e-Palette Alliance partners (including Amazon, DiDi, Pizza Hut, and Uber) in addition to the technology partners

(DiDi, Mazda, and Uber). The alliance is empowered by Toyota's Mobility Services Platform (Toyota, 2016), which is 'Toyota's framework for a range of connected vehicle applications, providing a full suite of services needed to support MaaS ranging from vehicle leasing and insurance to fleet management and big data' (Toyota, 2018a).

Let us consider what e-Palette is intended for by examining the concept video (WOW, 2018). In the opening video, the e-Palette is portrayed as a 'dream factory' with multifunctionality including a sports brand showroom, ride sharing, accommodation, a fabrication lab, restaurant, lounge, and flea market. According to the video, e-Palette provides an 'on-demand retail experience' by becoming a mobile retail stop from which goods can be ordered online via cashless payments. The section on 'multi-purpose moving space' shows that the e-Palette can turn into a mobile office or fabrication lab. The 'mobile personal shops' function as a personal mobile marketplace where users can buy and sell their own goods and products. Here again, payments are cashless. The 'on-demand city' section tells us that 'many types of services can gather even in remote areas [such as a boxing match held in the middle of a desert], blurring the lines between brick and mortar, retail, and e-commerce' (WOW, 2018).

The second concept video, entitled 'Basic Function video', focuses on e-Palette's multifunctionality. The vehicle can be used for ride sharing in the early morning or as a hospital shuttle mid-morning. During lunchtime, it can be used simultaneously for lunch delivery and ride-sharing shuttles. In the late afternoon, it turns into an office-sharing vehicle. In the early evening of commuting time, it is again used as a ride-sharing vehicle. After the depiction of multifunctionality, the video shows e-Palette's contribution to 'logistics innovation,' which is '[a]utomated delivery services from distribution center to final destination, using right-sized and right place mobile

solutions' (WOW, 2018). Packets carried by larger-size e-Palettes are transferred to mid- to smaller-size e-Palette vehicles, and then distributed to various final destinations. Then, at the final destinations, an even smaller, automated mobile cart with a facial recognition function carries the packet to individual customers' houses, offices, and shops.

Although the e-Palette is still at the concept stage, concrete plans for real-world applications are already being laid out. For example, the e-Palette is one of the key CASE and MaaS vehicles which will be showcased at the 2020 Tokyo Olympics and Paralympics (Toyota, 2018b).

To move toward concrete real-world applications, Toyota and SoftBank agreed on a strategic partnership in October 2018 to establish a joint venture firm called MONET Technologies Corporation by April 2019 (Toyota, 2018b). The announcement by SoftBank Corp. and Toyota Motor Corporation clearly represents the direction of CASE and MaaS:

> MONET will provide coordination between Toyota's Mobility Services Platform ("MSPF"), Toyota's information infrastructure for connected vehicles, and SoftBank's Internet of Things (IoT) Platform, which was built to create new value from the collection and analysis of data acquired from smartphones and sensor devices. By utilising a wide range of different forms of data related to automotive and human mobility on both platforms, MONET is aiming to optimise supply and demand in transportation and, ultimately, to launch Mobility-as-a-Service (MaaS) businesses capable of resolving social mobility issues and creating new value. (Toyota, 2018c)

As is clear from the example of the e-Palette, the automobile industry's service industry component is expanding.

2.2 Nissan's Easy Ride

The second example of MaaS is Easy Ride, a 'new robo-vehicle mobility service' (Nissan, 2017) being developed by Nissan and DeNA. The concept car uses Nissan's electric vehicle, Leaf, as the development basis. According to Nissan Reports:

> With 'more freedom of mobility' as its concept, Easy Ride is envisioned as a service for anyone who wants to travel freely to their destination of choice in a robo-vehicle. The goal is to allow customers to use a dedicated mobile app to complete the whole process from setting destinations and summoning vehicles to paying the fare. (Burlington Nissan, 2017)

Easy Ride completed its first public field test in the Minatomirai district of Yokohama, Kanagawa Prefecture, Japan from 5 to 18 March 2018. The second field test has begun on February 19, 2019.

Let us describe the service by introducing the Easy Ride concept movie (Easy Ride, 2018). First, the fully autonomous driving Easy Ride picks up two international tourists at the airport. Once in the car, the male tourist asks in English: 'Are there any recommended tourist spots around here? Easy Ride comes up with several recommendations with customer ratings. The female tourist asks in French to stop at a cake shop later, and Easy Ride replies in French. Easy Ride then picks up other customers, this time an older couple who want to go for a drive by the seaside. Easy Ride comes up with a recommendation of going to the Shōnan area considering the weather. On the way to Shōnan, Easy Ride plays classical music customised to the

passengers' taste. Then, the scene turns to where Easy Ride picks up two young children after a piano lesson. The mother, who is at another location, talks to them via videophone to make sure the kids are okay. In the evening, a male passenger asks for a recommendation for a cake shop where he can purchase cakes for his children. Easy Ride comes up with a suggestion, and while the male is at the cake shop, Easy Ride self-drives around the shop so it does not need to find a parking spot. At the shop, the male passes the French female, who asked for a cake shop recommendation earlier that day. The male returns home and reserves the ride for the next morning at 8:30 am using his cell phone.

As is clear from the description above, Easy Ride is also an attempt at providing MaaS. While Toyota's e-Palette is intended as a kind of modular minivan, microbus, or larger fleet to accommodate both personal and business multifunctionality, Easy Ride uses a regular passenger vehicle more targeted at individual customers.

Despite the differences in detail, both cases – e-Palette and Easy Ride – clearly show that automobile firms and industry are expanding their activities from the manufacturing industry to include aspects of the service industry.

3. The Next-Generation Automobile Industry as a Creative Industry

As described above, the 'service industry' aspects of the automobile industry are expanding with the intensification of the trends of CASE and MaaS. In addition to the service industrial aspects, this paper contends that the creative industrial aspects of the automobile industry are gaining force. Let us discuss a few empirical examples of the

next-generation automobile industry as a creative industry.

At this point, a definitional caveat on the notion of the creative industries is in order. According to Moeran and Alačovska (2012: xii):

> Creative industries are generally defined as industries – such as advertising, architecture, art, computer games, crafts, cuisine, design, fashion, film, fragrance, music, performing arts, publishing, radio, TV, toys and video games – that are based on individual creativity, skill and talent, and that include an element of design. They have the potential to create wealth and jobs through developing intellectual property, which is why they are sometimes characterised as constituting a 'knowledge' or 'information' (as well as 'creative', 'cultural', 'aesthetic', 'mixed' and even 'catwalk') economy. They also tend to make use of particular organisational forms and work patterns that, partly at least, are seen to differentiate them from other kinds of industries.

Although this definition is quite broad and general, it is a good starting point for our discussion as it includes three key points. Firstly, it lists concrete examples of creative industries such as computer games, fashion, and film. This gives us a solid sense of what kinds of industries are considered examples – though selective – of creative industries. Secondly, it specifies the 'creative' part of the term 'creative industries' by focusing on 'individual creativity, skill and talent' with 'an element of design'. This specifies that creative industries need to include intentional designing based on human creativity. Thirdly, it specifies the 'industries' part of the term by highlighting the 'potential to create wealth and jobs through developing intellectual property', which foregrounds the economic aspects, as well as by pointing to the importance of making

use of ‘particular organizational forms and work patterns’, which foregrounds the unique organisational and labour-related aspects of the creative industries. This paper keeps the above definition in mind as it moves forward to examine the next-generation automobile industry as a creative industry.

3.1. NVIDIA

NVIDIA Corporation is an American semiconductor company based in Santa Clara, California. It was co-founded by Jensen Huang, Chris Malachowsky, and Curtis Priem in April 1993. The company is well known for its graphic processing unit for computer games, but is now equally strong in system-on-a-chip (SoC) units for mobile computing and automobiles.

The company’s first product was NV1, a graphic processing unit (GPU) equipped in EDGE 3D graphics board. EDGE 3D bundled Sega’s computer game software Virtual Fighter as a product demo that used the graphic processing function of NV1 (Nvidia, n.d.). In other words, NVIDIA began as a company one of whose key markets was the gaming industry. Since then, the company has cooperated with game console manufacturers. For example, it developed the graphics hardware for Microsoft’s Xbox game console and Sony’s PlayStation 3. Most recently, it co-developed Nintendo Switch with Nintendo. The company also produced a mobile game console named SHIELD in 2013. In sum, NVIDIA places its key emphasis on the gaming industry. With the technologies developed while working in the gaming industry, NVIDIA has now expanded its activities to general-purpose computing. According to the company brochure (NVIDIA, 2018), ‘Today, NVIDIA powers the world’s fastest supercomputer, as well as the most advanced systems in Europe and Japan’. Extending these

developments, NVIDIA technology is now widely used in the next-generation automobile industry. The company brochure clearly states:

> Transportation is a $10 trillion industry. Autonomous vehicles will change it forever, making our roads safer and our cities more efficient. More than 370 companies are using NVIDIA technology in their datacenters and vehicles. They range from car companies and suppliers, to mapping and sensor companies, to startups and research organisations. (NVIDIA, 2018)

In sum, because of the importance of artificial intelligence (AI) and graphic processing capabilities both in the gaming industry and the autonomous vehicle industry, the line between the two industries – gaming, which has been considered a creative industry (see the above definition by Moeran and Alačovska (2012)), and the automobile industry, which has been considered a manufacturing industry – has become increasingly blurred. This blurring of the line is happening in both hardware and software developments. This blurring of the line separating the manufacturing industry and the creative industries can clearly be sensed by visiting NVIDIA's website. In the 1990s, when the company was founded, NVIDIA's website highlighted partnerships with companies in the gaming industry – say, Sega – clearly claiming that it was working in the creative industries, one of whose key constituents is computer games. In contrast, today's company website clearly shows that NVIDIA has expanded into a company that has many interests in a variety of industries. For example, the website lists eight platforms including autonomous machines, data centres, deep learning and AI, design and visualisation, healthcare, high performance computing, self-driving cars, and gaming and entertainment. In sum, the emergence of firms like NVIDIA corroborates

the contention that the next-generation automobile industry is now closely linked with the gaming industry, which is included in the creative industries.

3.2. Video Games and Autonomous Driving

Another empirical example of the increasing merger between the gaming industry and the automobile industry is in the area of simulation for autonomous driving vehicles. As has been widely reported in the media, in March 2018, Uber's field experiment of an autonomous driving vehicle resulted in the first fatality of a pedestrian caused by an autonomous driving vehicle (*The Economist*, 2018). In the same month, a Tesla driver was killed when the driver was using the autopilot mode. The reaction from the public was quite strong, and these accidents have caused major concerns regarding the development of autonomous driving technologies.

One possible solution to the potential problem of field experiments in the real world is to use racing or car-action video games as a means of simulation in the virtual world. For example, Bloomberg reported that developers of autonomous driving vehicles were using video games such as Grand Theft Auto V, an auto crime action game produced by Rockstar Games, to simulate in the virtual world the autonomous driving environment of the real world. According to the news report:

> 'Just relying on data from the roads is not practical', said Davide Bacchet, who leads the simulation effort in San Jose, Calif., for Nio, a startup aiming to introduce an autonomous electric car in the United States in 2020. 'With simulation, you can run the same scenario over and over again for infinite times, then test it again'. (Hull, 2017)

Similarly, Sony PlayStation 4's driving simulation game Gran Tourismo is reportedly being used by the manufacturers and developers of autonomous driving vehicles including NVIDIA (Kobayashi, 2017).

As can be gleaned from the above examples, the video game industry, both in terms of software and hardware, is now closely linked to the automobile industry in the area of autonomous driving technological development.

3.3. Sony's New Concept Cart SC-1

The final example of the automobile industry possibly becoming a part of the creative industries is Sony's prototype vehicle, which was made public in October 2017. The vehicle combines Yamaha Motor Company's golf cart body with Sony's advanced technology in AI, robotics, camera, and sensing (Yamaki, 2017). The vehicle is electric, and it can be driven by a human driver or remotely controlled. High-quality image sensors are positioned in the front, back, left, and right, so windows are not needed (Sony, 2017b); instead, New Concept Cart SC-1 is equipped with five 4K displays – one 49-inch display placed inside and four 55-inch displays placed outside (Sony, 2017b). The quality of the image sensors is better than human eyesight, so the driver can drive the car looking at the front display without headlights during night-time (Sony, 2017b). Image sensors can recognise the environment, including people, around the vehicle, so the external displays can display information and advertisements tailored to passers-by (Sony, 2017b).

One of the unique features of the New Concept Cart SC-1 is a technology called Mixed Reality (MR), which can combine the surrounding views captured by the image sensors with computer graphics (Sony, 2017b).

The concept video (Sony, 2017a) shows footage from a field experiment in MR at Kanucha Resort, a resort hotel in Okinawa. The MR demo is called ‘Moonlight Cruise’, in which the real images of the surroundings are mixed with fictional animals and sounds. In the words of Shin Takanashi, one of the people involved in the development of the New Concept Cart SC-1:

> With the layering of computer graphics and sounds, if the bland outside views through the window turns to the exciting experience, then the mobility of necessity may well become mobility of entertainment. (Sony, 2017a)

The case of the New Concept Cart SC-1 is noteworthy in that it clearly shows us the possibility of the automobile industry merging with the creative or entertainment industries.

4. Conclusion: Towards the Strong Programme in Creative Industries Studies

If the automobile industry – in particular the next-generation automobile industry – is expanding its spheres of activity to include the creative industries, then what sort of implications does the transformation have on the analytical approaches in creative industrial studies? This paper argues that creative industries studies need to move towards the ‘strong programme’.

The term ‘strong programme’ characterises the approach of a group of scholars in science and technology studies (STS) (e.g. Bloor, 1991). According to the proponents of

the strong programme, social scientific studies of science and technology until the emergence of the strong programme had only focused on the 'false' sciences such as phrenology, explaining their 'failure' by examining 'social factors' – such as political and economic interests, or social and cultural norms – that had led to the 'false' claims. In other words, there had not been much room for social sciences to study the 'true' scientific practices because 'successful' sciences had been believed to be led by inevitable 'truth'. The strong programme, however, claimed that social sciences should examine both successful and failed sciences by focusing on social factors because human cognition, which cannot avoid influences from those factors, is an inevitable component of all scientific practices and discoveries.

Extending the strong programme in STS described above, cultural sociologists have made a similar argument that sociologists examining the 'culture' – systems of meanings – had unduly focused on the sociological surroundings of cultural phenomena and did not adequately focus on how culture – the rich web of meaning systems – worked (e.g. Alexander, 2002; Alexander and Smith, 2010). For example, when sociologists of culture study art, they had tended to examine how professional organisations work or how artists secure funding, but had not closely analysed the meaning of art objects themselves and how these meanings might influence social practices. The social world is composed of rich and complex webs of meanings, and without clearly understanding them, sociology will not develop to its full potential. In other words, cultural 'meaning really does count' (Alexander and Smith, 2010: 13).

In sum, both the strong programme in STS and the strong programme in cultural sociology critiqued the overly narrow focus on the targets of investigations – science and technology and culture respectively – and argued for broader, more comprehensive

approaches. This paper argues for a similar expansion of creative industries studies towards a strong programme in two senses. Firstly, similar to the expansion suggested in the strong programme in STS, creative industries studies need to extend their examination to more core technological and scientific aspects of the creative industries. For example, when creative industries studies examine the gaming industry, they tend to focus either on the game designers or users and not on the technologies that underpin the production and consumption of a game. To be more concrete, when a scholar studies, say, Sony's PlayStation games as creative industries, the scholar may focus on the game designers or the user experiences, but not the research and development or manufacturing processes of the PlayStation hardware. To grasp the full picture of the world of PlayStation, however, researchers need to be attentive to the technological and scientific, as well as social and cultural, aspects of the game. So, for example, studies of the scientific and technological practices of NVIDIA should become an important aspect of creative industries studies.

Secondly, because of the need to distinguish itself from a more humanistic approach, similar to the sociology of culture before the strong programme, creative industries studies have tended to shy away from close examination of the meaning of creative industries products. To fully capture the workings of the creative industries, as with the case of the strong programme in cultural sociology, creative industries studies need to zero in on the complex meanings attached to the products. Hence, as this paper has briefly attempted, examinations of the visions and images presented in the concept videos of the next generation automobiles, for example, are necessary in order to fully capture the next-generation automobile industry as creative industries.

In conclusion, with the expansion of creative industries studies toward the strong programme briefly sketched above, we will be able to more fully capture the world of the next-generation automobile industry as a creative industry.

A Note on Policies

In discussions on the creative industries in Japan, discourses against the active involvement of the state in the creative industries are prevalent. For example, a cliché such as 'It's not cool for the government to be involved in the Cool Japan policy' is often heard both amongst industry personnel and scholars. Given the academic genealogy of creative industries studies in cultural studies, the Frankfurt School, and more generally critical studies, it is understandable and healthy to keep a critical eye on government involvement in cultural matters. This is especially pertinent given the history of government involvement in popular culture during the Second World War in Japan (e.g. Nakajima, n.d.). Therefore, we need to be observant of the possible negative involvement of the state in the creative industries. Because of the overemphasis on critiquing the government, however, it is also the case that scholars in creative industries studies have not presented policy suggestions effectively on how the government should relate to the creative industries. In other words, in terms of the discussion of the role of the state, we need to move towards a constructive re-composition of public policies. A comprehensive discussion of the role of the government will have to await future studies because of space limitations. The following, however, may be an important starting point for a more precise examination of the role of the government in the creative industries in the future.

To capture the merger of the manufacturing, service, and creative industries

examined above, which signals a drastic shifting of the boundaries of different industries, we need to 're-imagine the role of the state' (Nakajima, 2018). For example, the question such as "Which government department should be responsible for the automobile industry?" becomes highly complex in the age of the next-generation automobile industry. If we follow the traditional manufacturing-centred concept, the Automobile Division of the Ministry of Economy, Trade and Industry (METI) should be responsible. If we foreground the software, content, and entertainment aspects of the industry, however, METI's Cool Japan Policy Division should be responsible. If we focus on the 'connected' aspect of CASE, then various divisions of the Ministry of Internal Affairs and Communications should be responsible. This paper does not contend that ministerial boundaries should be erased; a clear division of labour based on professional knowledge and expertise is needed to help the next-generation automobile industry develop. Given the rapidly changing and increasingly complex development of the next-generation automobile industry, however, a more integrated vision of the development of the industry – under the aegis of which the division of labour is effectively accomplished – is needed. Moreover, more coordination mechanisms which could connect the multiple ministries and divisions are needed to push forward the development of the automobile industry as a creative industry in Japan.

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