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Demographic, Behavioural, Cultural and Socioeconomic Factors on Transport Sector Workforce in Europe

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Abstract

This paper was conducted in the framework of the "SKILLFUL - Skills and competences development of future transportation professionals at all levels" project, financed by the European Commission. The objective of the paper is to map the major trends of the transport workforce with regards to demographic, behavioural, cultural and socioeconomic factors, in the short, mid and long-term. The correlation of these factors with existing and emerging professions in the transport sector will also be identified. The analysis of the aforementioned different factors and their impact on transport workforce are considered to be key-issues regarding the evolution of the workforce and the future market needs. The methodology for mapping each factor is based on the analysis of recent literature sources and the synthesis of the main findings. Key-input and ideas from transport experts and the results of the related interactions have also been embodied in the findings. Overall, it seems that the future transport workforce will not only be influenced by the changing and evolving needs of the sector,its associate business schemes and enabling technologies. It will also be shaped by the prevailing social trends in Europe.

Keywords: transport; workforce; demographic; behavioural, cultural; socioeconomic.

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1. Introduction

This paper was conducted in the framework of the "SKILLFUL - Skills and competences development of future transportation professionals at all levels" project, financed by the European Commission. Nowadays, workforce faces great challenges emerging from the new adopted needs of the society. Concerning the transport sector, the new challenges are absolutely mirrored by the commuting trends of modern-model societies (Tataj et al. 2015, Johnsen 2015, Megatrends 2014). As a result, future transport workforce will not only be influenced by the changing and evolving needs of the sector and its associate business schemes and enabling technologies. It will also be shaped by the prevailing social trends in Europe, such as ageing of the workforce, resulting in the need to integrate immigrants into the workforce and the fight against the exclusion within certain groups, such as people with disabilities, computer illiterate people, etc. (Tuite 2016, Wang X. 2015, Leigh Day 2014). Also, the sychromodality and multimodality of the emerging market trends that will undeniably affect the future social norms will be emphasized in this paper.

In the framework of this study, the analysis of the future social norms is mainly focused on four critical aspects namely: demographic, behavioural, cultural and socioeconomic that are deemed to be correlated to existing and emerging professions in the transport sector. The aforementioned different aspects and their impact on transport workforce are considered, nowadays, to be key-issues regarding the evolution of the workforce and the future market needs (Megatrends 2014). To shape the conditions of the transport sector, the following sub-sectors have been examined:

- Truck Transport
- Transit and Ground Passenger Transport (including urban transit-privately and publicly operated, taxis and bus, school and employee transportation)
- Air Transport (including airport operations, aircraft maintenance, and other support activities)
- Highway Construction and Maintenance
- Rail Transport
- Maritime Transport (deep sea, coastal, great lakes, and inland water transport, ports)

Concerning the four aspects of the analysis, first in demographics, the ageing of the workforce results in reluctance to follow technology evolution. At the same time, youth unemployment reaches high levels all over Europe. Women workers seem to be highly underrepresented throughout the transport industry. Immigration is an issue that European Union has to face in all sectors, as such transport workforce should be a working field on which immigrants can obtain expertise and work. Regarding the behavioural factor, technology innovation based on digitalisation and autonomy will transform the transport market needs both in terms of workforce numbers and new skills (digitalisation literate workforce). With regards to the cultural factor, digitalisation skills will be of pivotal importance not only for the employees but also for employers leading to expertise and upskilling of the potential workforce. Transport services will be integrated with the other sectorial services, requiring thus, an inter-disciplinary workforce. Hence, society will witness an inevitable shift in cultural attitudes spreading across the digital society and manifested by less ownership and more usage of the different means of transport. Also, concerning socioeconomics, the high unemployment rates for the non-digitalised workforce is a determinant parameter. Good and life-long education and training (with emphasis on vocational training) will prove to be a key to fight unemployment in low socioeconomic status neighborhoods and groups (Tuite 2016, Tataj et al. 2015, Johnsen 2015, Martin et al. 2015, Megatrends 2014, Manyika et al. 2013, TR News 2012).

The trend for innovation is mirrored by the life-cycle in transport demand. The core competencies in traditional transport stemmed from the basic mobility needs. Applied research and innovation still map new processes and services. All the above are exclusively analysed in the framework of this paper.

2. Scope and Methodology

In an attempt to capture the present and future trends in transport workforce, the objective of the paper is to map the major trends of the transport workforce with regards to demographic, behavioural, cultural and socioeconomic factors, in the short, mid and long-term. . The analysis in different terms and their impact on transport workforce are considered to be key-issues regarding the evolution of the dynamic of the transport workforce and the future market needs. In this paper, major trends of the transport workforce regarding the four factors are mapped in the short, mid and long-term and their correlation to the existing and emerging professions in the transport sector is examined.

Regarding the methodology for mapping each factor, relevant core and recent literature sources were analysed and the main related findings have been synthesized. Furthermore, key-input and ideas from the SKILLFUL experts and the results of the related interactions have been embodied in the findings. The conducted analysis is presented below so as to comprehensively cover each of the aforementioned four factors. The results are presented for each of the factor first, based on the current situation and short-term challenges and second, on future challenges.

3. Current Situation and Short-Term Challenges for the transport workforce

3.1 Demographic factors

Demographics in the European Union (EU) is undeniably facing great challenges in all sectors. Consequently, transport as a main sector that is affected by many other sectors, while at the same time influences them, has to cover the emerging needs and new schemes to be adopted with the view to following the evolution of technology and politics. On the one hand, technology drives the workforce to an inevitable shrinkage while on the other hand, immigration provides more an increasing workforce. Supplementary, aging of the workforce results in less expected personnel and in a reluctance to follow technology evolution, while youth unemployment rate is reaching high levels all around Europe. These issues result in unbalanced conditions, which need detailed analysis for covering the emerging challenges (Center for Young and Communities 2015, Jonsek 2015, European Commission 2014, Jasek 2010, Nonneman 2007).

In order to face demographic challenges, EU will need to deploy new policies regarding youth unemployment and mobility, education and life-long learning, gender diversity, immigration and retirement. Nowadays, some of the following aspects have been noticed regarding demographics.

Demographic trends have already been mapped not only in previous years but also nowadays, giving thus, an overview of the oncoming population challenges. Figure 1 gives an estimation of the United Kingdom (UK) population evolution up to 2031. The depicted trend can be considered as approximately representative for many other European countries with approximately the same living standards (Baster 2012).

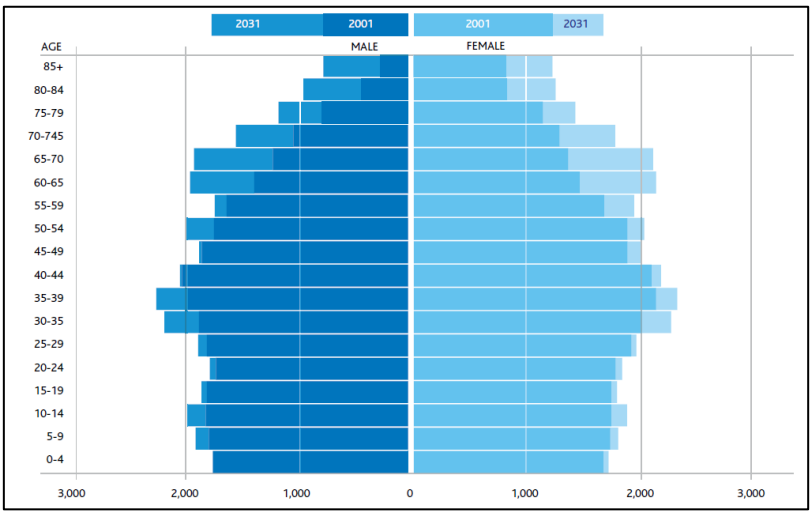

Figure 1: Evolution of workers distribution in UK by age as a percentage of total transport workers (years 2001 and 2031) (Baster 2012)

According to this figure, the post-war baby boomers are currently aged 61-66 and already make up part of the older population. As they grow older they will be joined by the 1960s baby boomers. The increasing number of people of older age will evidently have an impact on policy. However, this is not necessarily negative, and the ageing of the population should not be thought of strictly as a drawback or burden. The improved living standards and health should be considered as a positive evolution. It is also important that quality of life does not fall behind. All citizens, if possible, should be able to enjoy this longevity been achieved (Baster 2012). Regarding the ageing of the workforce, it has been noticed that the 53% of current workers within the six transport subsectors (truck transport,

transit and ground passenger transport, air transport, highway construction and maintenance, rail transport, maritime transport) are 45 years or older, 9% more than the European average (Martin et al. 2015). The need to replace retiring workers creates significant workforce development challenges.

Transport professions are deemed particularly prone to ageing and given that it is unclear whether structural changes aimed at delaying retirement are going to alleviate the potential lack of labour supply in the sector. The analysis of the age distribution of the current workforce in the transport sector shows a clear shift over the previous decade towards older cohorts, as well as lower rates of entry into these professions (Figure 2) (Christidis et al. 2014).

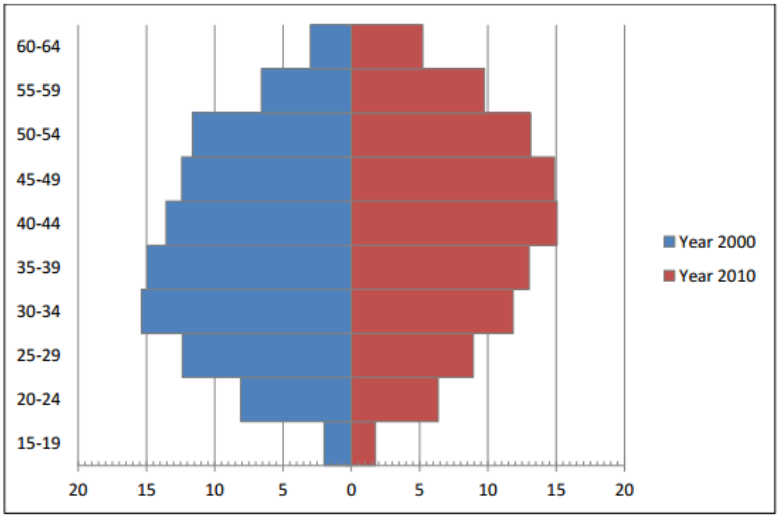

Figure 2: Evolution of workers distribution in EU by age as a percentage of total transport workers (years 2000 and 2010) (Christidis et al. 2014)

Additionally, nowadays, women comprise 47% of the total employment. However, women workers are highly underrepresented throughout the transportation industry based on recent literature (Rust 2015), available from Data Bureau of Statistics – Labor Force Statistics from the Current Population Survey.

As far as the immigration is concerned, over the past 10 years, immigrants represented 47% of the increase in the workforce in the United States, and 70% in Europe (OECD 2013), whereas, on average, over 1/3 are tertiary-educated. In Views 2030 (Tataj et al. 2015) is mentioned that the same proportion, however, has not completed their upper-secondary education. Since 2000-2001, immigrants have represented 31% of the increase in the highly educated labour force by 14% in Europe. Also, it is mentioned that new immigrants represented 22% of entries into strongly growing occupations in the United States and 15% in Europe. Overall, the effects of immigration in unemployment in the United States have usually insignificant wage effects; in Europe especially in Germany, the wage effects are nil, but more immigration does have minor effects on unemployment in general.

Concerning the dynamic of the workforce, surveys found that nearly one in three people describe themselves as disabled in some way, and about half of them said their day-to-day activity is limited as a result. Those who have impairments tend to be older (55% above 65 years old), and have lower educational attainment (49%), which means that a part of this disabled population would naturally be more susceptible to unemployment. In fact, less than half of disabled people are in employment, compared with three quarters of working age non-disabled people (Leigh Day 2014).

Up to now, various data sources confirm wide differences between the employment rate of the general adult population and that of adults with disabilities (The National Centre of Mental Health Research, 2013). Even among those with disabilities who are employed, few are working full-time or nearly full-time, acquiring company-paid benefits, and/or earning a living wage (Beaton 2012). However, future workforce needs qualified people and appropriately educated in new technologically advanced areas, without any discrimination in physical abilities between employees.

3.2 Behavioural factors

As repeatedly mentioned and analysed above, technology innovation based on digitalisation and autonomy is expected to transform the transport needs both in terms of workforce numbers and new skills (need for digitally literate workforce at short term and "digitally natives" at mid to long term). In general, people seem to be willing to modify their attitude towards autonomy, especially when realizing that autonomy is, in most cases, interrelated to driving safety. Hopefully, not only young people are keen on new technology but also the elderly who appear to feel safer by using autonomous cars mostly combined with a help driver system (Abraham et al. 2016). As language learning was a new skill required over the last decades from transport personnel due to cross-border and seamless transportation networks; digital literacy is going to be the new training focus.

Technology-driven innovation means that new services are invented simply because the technology permits them. This no longer provides companies with a sustainable competitive advantage; instead, successful innovation happens in a continuous dialogue about what people want and what technology can supply (Tataj et al. 2015).

Employees have adopted contractual collaboration agreements in various business projects, which allow them to share information and jointly develop new knowledge and technologies. Towards that, it cannot be neglected the car-pooling or car-sharing ideas that have been adopted by workers, practices that people were more reluctant to follow during the previous decades. This is a valuable example so as to provide evidence that mentality of the new workers follows new paths, unstacked from old standards and bias (Abraham et al. 2016, European Commission 2013, OECD 2013).

However, as already mentioned, mainly the youngsters should modify sometimes or manipulate their interests in order to be in accordance with the potential job market trends. Undeniably, this attitude often affects their psychology as well as their dedication and willingness to deal with their job challenges. For example, freight transport seems to have increased during the last years although total economy rates are decreasing. This means that many people will focus and be trained to join this area. However, it would be a good issue to investigate how many new workers of this area, really enjoy their professional challenges. All in all, it is considered that the new trends in the workforce need to be adopted smoothly by the potential new workers in order for them to become keen on following the new market needs (Tuite 2016, Centre for Youth and Communities 2015, Tataj et al. 2015).

3.3 Cultural factors

Transport workforce will adopt the new emerging demands of the sector. Digitalisation skills as well as expertise and upskilling of the potential workforce will be of pivotal importance not only for the employees but also for employers. Transport services will be integrated with the other sector services, requiring thus, inter-disciplinary workforce, emphasising on digitalisation skills. The continuously changing conditions in the transport sector in terms of transport habits, infrastructure, vehicles and the use of technology force the adjustment of transport culture of both users and professionals so as to comply with these new conditions (Abraham et al. 2016, U.S. Department of Education 2015, European Commission 2013).

Adams in Transport and Logistics Workforce Trends (2015) mentions that based on a recent survey, 87% of employers recruited and upskilled new staff as their primary method of meeting labour demands. Furthermore, 83% of employers surveyed expressed a preference to develop their existing staff through upskilling, training and mentoring. However, some people seem to be reluctant in changing their preference on following new market trends, as people need to change their mentality so as to be on the same track with the emerging job market needs. Towards this goal, upskilling and training campaigns will prove to be effective, and this by itself, opens new horizons for other vacancies.

As Europe's cities are structured into urban and suburban areas this design turns to have implications on mobility. For example, the growing share of the elderly population that wants to commute independently requires either changing public transport, or redesigning cars to assist older drivers in analysing data and making decisions. It is easier for older people to accept changes to their transport choices if they make the decision themselves. This change in people's culture on mobility aspects will undoubtedly raise the demand for workforce that can fulfill this emerging challenge (Tataj et al. 2015, Word Economic Forum 2013, European Commission 2013).

A rise in the number of people living by themselves will in a way transform the transport needs. Around 60% of women and nearly 30% of men over the age of 75 live alone today. Based on this, semi-autonomous or autonomous vehicles are a hot transport topic and their use is expected to increase rapidly in the coming years. Abraham et al. 2016, Martin at al. 2015).

3.4 Socio-economic factors

In socio-economics, the high unemployment rates for non-digitalised workforce is a determinant parameter. Also, the ever-increasing trends in social and economic discrepancies between skilled and non-skilled workforce leads to higher competition in entering the sector. Transport further internationalization, together with further global growth, will increase transport workforce needs (Tuite 2016, Center for Youth and Community 2015).

The emergence of mobile applications, and especially this of social networking sites, has created a totally new industry, with its specific business models taking advantage of the existing telecommunication infrastructure built before the mobile-apps boom. The use of smart phones, high speed networks and social media alters the form of interfaces and the subsequent jobs to support apps and services provision (Tataj et al. 2015).

Autonomous vehicles are a hot transport topic and their use is expected to increase rapidly in the coming years. This is absolutely interrelated to the current market in terms of designing and manufacturing those vehicles as well as redesigning infrastructure. As such, new challenges in transport workface are emerging (Word Economic Forum 2013).

Furthermore, as mentioned previously, freight transport is at an ever-increasing rate which means that new vacancies and needs already exist. However, the increased safety needs should not be neglected not only in freight transport but also in other sectors such as aviation (Adams 2015, Wang 2015). Increased safety rules create new job paths.

4. Future Challenges for the transport workforce

4.1 Demographic factors

In Views 2030 (Tataj et al. 2015) is mentioned that according to surveys, working population in Europe is expected to decline by 21 million by 2030, due to a shrinking population, its aging and a shortage of qualified labour. As of 2013, the working population in Europe has already stopped growing. This will affect consumer trends, market size and employment.

Demographic changes as well as social and economic changes that are analysed below, will influence how and where the older population live. For example, as already mentioned, the rise in the number of people living by themselves in a way transforms the transport needs. Unfortunately, taking into consideration the increasing divorce rates, this trend may continue. Other probability patterns, such as people longer working hours, and different patterns of family structure, will potentially mean that the older population of the future will be different from their counterparts today hence, their needs could be more difficult to predict (Baster 2012).

Regarding the ageing of the workforce, changes caused by the extended retirement age resulting in more and more of older age people to continue working cannot be ignored. Hence, older workers face challenges related to their health and mobility patterns. Employers are expecting that older workers will work the same as the younger or middle-age people, but due to elderly people behaviour (especially on driving) and health condition, some positions increase the risk of reduced travel safety or less effective work. Therefore, there should be developed strategies/procedures/recommendations for older people recruitment. These apply mostly when employees are recruited for jobs where driving is the most significant task. Whilst profiles of safer drivers can be established, it is also necessary to consider the other responsibilities of employees, and/or training so as to improve driving performance, increase awareness of the risks and development of skills (Tataj et al. 2015, Sabbati 2013).

Changing demographics (i.e. a growing number of elderly people and ‘millennials’) will bring about a redesign of public transport systems and cities’ infrastructure to embrace radical innovations and new patterns in modern transport and service needs such as self-driving cars, new concepts of car ownership and a shared economy. Those

trends will influence undeniably the job market in regards of redesigning and constructing infrastructure as well as in manufacturing new machinery (Tuite 2016, Tataj et al. 2015).

4.2 Behavioural factors

A radical shift in the workplace will require new work design, organizational structure, and leadership style. Particularly, modern cities will allow new services to people and demand for workforce skilled in digitalization. Also, advanced commuting technology will affect both the nature of vehicles and the environment in which they are used. The former will allow to work while being transported. The latter will include digitalization of smart city systems infrastructure and intelligent networks, gathering all sorts of data including traffic control, incidents, safety and security. The technology will also affect the environment, for instance, self-driving cars will require city planners to index every city sign and continuously monitor their accuracy (European 2013, Manyika 2013, OECD 2013).

Climate changes are now being in a high priority for all the developed countries. Hence, new technology in transport modes as well as people's patterns on selecting the most effective way to commute or travel will be affected. Towards that, new targets will be set from each country, either to inform people on the significance of choosing green transport modes or to redesign infrastructure in a more environmentally friendly way (Tataj 2015, TR News 2012).

4.3 Cultural factors

Some of the future challenges that have to be managed are diversity and exploitation of multicultural talent. These aspects will constitute some key challenges. Society will witness an inevitable shift in cultural attitudes spreading across the digital society, manifested primarily by less ownership and more common or shared usage of the different means of transport.

All these new facts lead to the need for developing a different transport culture, adjusted to the new conditions and prepared for the future further changes in the transport sector. Emphasis should also be given to transport safety culture in particular. Transport accidents represent a serious public health problem. One important accident risk factor not currently addressed by traditional transport safety interventions is poor safety culture. The safety culture perspective is quite new to the transport sector, and more research is needed for the perspective to be as crucial in the transport sector as it is in hazardous industries. It is decisive to establish the importance of transport safety culture in influencing transport safety behaviour and safety outcomes, and to clarify how this knowledge can be used to enhance transport safety (European Commission 2013, OECD 2013).

Ultimately, transport habits are changing as travel options are more numerous, faster and cheaper and new transport modes become more and more popular.

4.4 Socio-economic factors

Education will constitute a pivotal role in order to properly drive new potential workers on covering the future and each emerging demand. As a result, new education schemes will become increasingly focused, not just on knowledge, but also on strategic skills that students need to get a job.

Undoubtedly, the coming decades will be shaped by the process of converging through interdisciplinary developments. New technology platforms will drive transport development where scarcity of resources and societal challenges will prevail. Supplementary, we will witness a shrinkage of vacancies, addressed mainly to computer literate or to those being keen on following the improvement of technology. Also, it is important to mention that the talent shortages and demand for technical competences will push a return to professional and vocational training, devaluing generic university degrees (Tataj 2015, US Department of Education 2015, Manyika 2013). Need for experts and skillful employees will characterize the jobs needed in the future.

On the other hand, new manufacturing trends such as designing of new modes using new sustainable materials will provide new vacancies for research on those new materials. Furthermore, climate challenges and the need for energy saving will totally affect the new transport patterns in accordance with the evolution of social needs. The

need for a nation to invest on emerging technologies and new patterns will encourage and push workforce on new and why not innovative jobs, increasing also the employment rate.

The two radar charts (Figure 3) show the employment and unemployment rate for each of the 27 Member States and EU in total in 2010 and 2060. Employed persons comprise persons aged 15-64 years who during a reference week worked for at least one hour for pay or profit or family gain or were temporarily absent. Unemployed persons comprise persons aged 15-64 years old who were not employed, were currently available for work and were actively seeking work. Projections for the 2060 rates have been made by the EC based on trends in employment patterns of women, older workers and young people (Sabbati 2013).

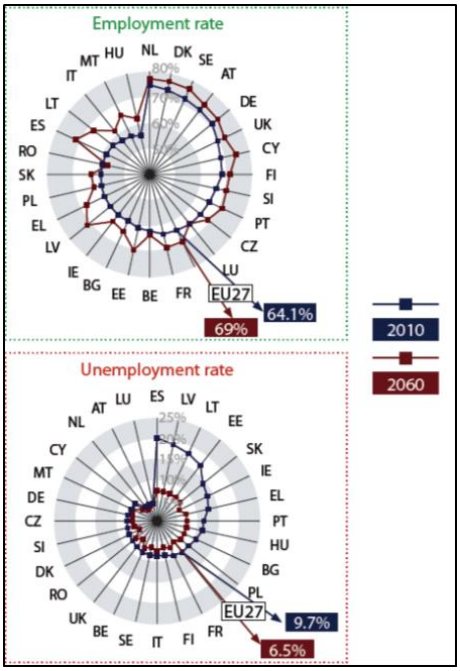

Figure 3: Employment and unemployment rate for ages 15 to 64 years old, in EU27, in 2010 and 2060 (Sabbati 2013).

5. Synthesis – Conclusion

In this paper, major social trends of the transport workforce are considered, mainly focusing on four factors that map the dynamic and evolution of the future in transport workforce: demographic, behavioural, cultural and socioeconomic factors. These factors were analysed as it is believed that they can reflect not only the basic challenges that society faces nowadays, but also define the basic paths on which transport evolution should develop new schemes and solutions.

- On demographics, the ageing of the workforce results in reluctance to follow technology evolution. At the same time, youth unemployment reaches high levels all over Europe. Women workers seem to be highly underrepresented throughout the transport industry. Immigration is an issue that EU has to face in all sectors. Transport should be a working field on which immigrants can expertise and work. Future workforce needs qualified people, appropriately educated in new technologically advanced areas, without any discrimination based on physical abilities of the employee. The fact that jobs related to physical abilities (manual jobs) are being constantly reduced and the emergence of robotics provide a fair opportunity to people with disabilities to be better integrated in the future workforce.

- Regarding behavioural factors, technology innovation based on digitalisation and autonomy will transform the transport market needs both in terms of workforce numbers and new skills (digitalisation literate workforce), with major improvements in terms of work efficiency, safety, environment and energy inputs. It is considered that the new trends in the workforce need to be adopted smoothly by the potential new workers in order for them to become keen on following and handling the new market needs. Regarding climate change, new targets will be posed from each country either to inform people on the

significance of choosing green transport modes or redesigning infrastructure in a more environmentally friendly way.

- Concerning cultural factors, transport workforce will adopt the new emerging demands of the sector. Digitalisation skills will be of pivotal importance not only for the employees but also for employers leading to expertise and upskilling of the potential workforce. Transport services will be integrated with the other sectorial services, requiring thus, an inter-disciplinary workforce. Society will witness an inevitable shift in cultural attitudes spreading across the digital society and manifested by less ownership and more usage of the different means of transport. The continuously changing conditions in the transport sector in terms of transport habits, infrastructure, vehicles and the use of technology force the adjustment of transport culture of both users and professionals so as to comply with these new conditions.

- Finally, on socioeconomics, the high unemployment rates for the non-digitalised workforce is a determinant parameter. Good and life-long education and training (with emphasis on vocational training) is a key to fight unemployment in low socioeconomic status neighbourhoods and groups. New manufacturing trends such as designing of new modes using new sustainable materials will provide new vacancies. Furthermore, climate challenges and need for energy storage will totally affect the new transport patterns. The need for a nation to invest on emerging technologies and new patterns will encourage and push workforce on new and why not innovative jobs.

New technology seems to influence the existing modes of transport. As a result, society will witness a shift in cultural attitudes spreading across the digital society and manifested by ownership and usage of the means of transportation. This will also fundamentally change the way transport will be designed and operated. The total mobility structure is changing.

The core competencies in traditional transport came from the basic mobility needs. Applied research and innovation still define new processes and services. Adopting outcomes of the scientific and technological research and building innovative solutions on top of the existing technology in transport sector will become a maturing process in every future sector.

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