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Information and Communication Technologies, Social impacts of

Context

Information and Communication Technologies (ICTs) are increasingly used in transport to make travel more efficient and cost-effective. However, such pervasive technologies do not come without an array of social impacts attached to them which form the focus of this entry.

Radical technological changes have occurred in the dawn of the 21st century creating high expectations both for developed and developing countries. Referring to the UK as an example of a developed country, mobile phone ownership has increased from 36% in 2000 to 91% in 2011, while the number of landlines has dropped from 93% in 2000 to 81% in 2011. Similarly, internet penetration has risen from 25% in 2000 to 76% in 2011 (63.8% in the EU) and the increase of mobile phone data transferred has increased forty times between 2007 and 2010. On the contrary, the internet penetration rate in Asia is 19.4% and only 6.8% in Africa. Alike, the entry level fixed broadband connection cost is on average $28/month in developed countries, but it averages $190/month in developing countries. Linking these facts with social media, 48% of adults in the UK have a social networking profile, whilst 57% of mobile phone internet users there visit social networking sites through their mobiles, making it the most popular activity. Analogous is the situation in Italy, where almost every individual has two mobile phones, whilst smartphones are used by more than one out of three users in countries such as the US, Sweden, Italy or Germany. At the same time, almost half of mobile phone users in developed countries including the US, the UK, Germany, Italy and Australia use their phone to access the internet. More than 700 000 apps exist at the beginning of 2013 in the two main smartphone apps marketstores, demonstrating an immense interest by users, businesses and governmental organisations for ICTs and mobile internet. Although there are households in developing countries where five people share the same phone device highlighting the diverse needs in various contexts, it is universally acknowledged that accurate and timely information has become highly valuable.

There are a few other sectors other than transportation where accurate and timely information is valued more. This is reflected not only in the ever growing number of transportation related smartphone apps but also in the actual infrastructure installed in vehicles, railway stations, airports, car parks or bus stops. The overall purpose of ICTs is to make passenger and goods transportation more enjoyable, safe, efficient and cost-effective. Hence, this entry outlines certain areas that require constant attention by academics, practitioners and policy makers, such as the increased role of social media, the altered levels of social interaction, personal safety, privacy, surveillance, inclusive access and the digital divide.

Positive impacts

Established trends such as tap cards for public transport (e.g. TAP card in Los Angeles, Oyster card in London, Octopus card in Hong-Kong), e-tolls in motorways or urban areas (e.g. in Stockholm or Singapore), and emerging ones such as experiential marketing, which is already utilised by car manufacturers to provide a personalised test drive experience and eventually boost car sales, are becoming the norm in developed countries. The use of a common social media profile facilitates such services both for users and providers.

Another key benefit through the wide use of smartphones and improved infrastructure such as 4G-LTE networks is the opportunity for users and transportation authorities to receive real time updates about congestion, transportation service overcrowding, accidents or road works through ICT sensors. The widespread use of social media has facilitated this trend and has opened up communication channels between users who may not have been acquainted to each other previously. Car clubs and information sharing about new walking or cycling routes are common benefits of such web-services or smartphone apps. Personal safety improvement during journeys through location tracking by friends and relatives is another positive impact for vulnerable social groups, whereas augmented reality gadgets overlaying the real world with virtual or computer generated images (e.g. Google Glass) claim to provide a wealth of information to the user in interactive ways. If these claims are realised, this may be invaluable for car drivers, public transport users, pedestrians or cyclists since they will be offered key information at no time leaving their hands free, thus increasing their safety during journeys.

These developments have also aided more direct communication with local authorities overcoming traditional bureaucratic and hierarchical structures to report bottlenecks or maintenance issues requiring immediate action. This has created a bottom-up approach which supports well-being while promoting resilient infrastructure as it has been proven to be helpful in emergency situations as for example during natural disasters in the US or social unrest in the Middle East.

The major implication of ICTs for transport though is the creation of new valuable datasets since all individuals are constantly on the move, generating new data which can be used to inform policies, research or business decisions. This has been highlighted by the World Economic Forum in their review about the overarching principles for using personal data which need to be refreshed to ensure that they protect the rights of individuals, while at the same time they unlock socio-economic value in a hyperconnected and hypermobile world. Personal travel data have high intrinsic value individually but also collectively, and this is exaggerated with the development of Big Data alongside ICTs which generate vast amounts of easy to transfer data in industries such as public transport, railways, air transport or logistics.

Contrasting the state owned urban public transport operators in France (e.g. RATP in Paris) with the private corporations providing similar services in the UK (e.g. bus companies in Leeds) it is easily understood that transport authorities in conurbations benefit by the collection and use of such data in both cases. Therefore, it is crucial to manage the increasing volume of data in such a way to ensure that any potential benefits will add value to all stakeholders of urban environments. Open Data initiatives target such objectives and there have already been some nascent but interesting applications aiming at near live train departure updates or road maintenance reporting on the move. The latter is fuelling the exponential growth of the volume of smartphone and web applications related to urban transport which spans across sectors as diverse as logistics, taxis, cycling, car sharing, car parking, car insurance, accident reduction through location tracking, personalized travel coaching, street maintenance, carbon emissions reduction and other ‘green’ initiatives as well as the promotion of healthier lifestyles through travel reward schemes.

Negative impacts

On the other hand, ICTs for transport may introduce negative impacts to particular social groups. Disabled people, i.e. mentally or physically impaired people as defined by the World Health Organisation, face such impacts because a lot of the new services, infrastructure or smartphone apps have not made any specific provisions for them or they only provide a restricted version for their needs enhancing their disadvantage. The elderly or

those who are not familiar with new technology form another disadvantaged group. These so called 'technology illiterate' may also be affected by the cost of new infrastructure or devices, which creates social inequalities linked to their income or home location. Such inequalities may be exacerbated in the future if certain impacts such as electrohypersensitivity are neglected or not sufficiently supported by scientific evidence.

Furthermore, due to the increased time people have been observed spending using 'smart' devices, a decrease has been reported concomitantly in time spent for actual interaction with family, friends and colleagues. In addition, the fact that workers may be required to work while on the move due to the ubiquitous nature of ICTs creates a further strain in the attempt to retain a work-life balance. This introduces the important topic of privacy and surveillance which has been under-researched in this domain despite being already a reality for bus, coach or truck drivers. Essentially, this is a debate about convenience and information flow on the one hand and personal privacy on the other. Such arguments are linked with the Orwellian Big Brother or the Foucauldian Panopticon notions which are particularly relevant to transportation due to the option to track location and potentially offer surveillance capabilities which did not exist until the 20th century.

An associated contemporary policy debate within the European Union (EU) is about the 'right to be forgotten' i.e. the option to completely delete one's on-line data. No political consensus exists about this issue yet as it is opposed by US corporations using individual data, since opponents of the 'right to be forgotten' in the UK claim that the British economy may lose £100 - £360 million annually, whereas EU officials advocate that there will be additional annual revenues of 2.3 bil € due to increased consumer trust in on-line services. While this debate remains on-going, it is a fact that increased mobility has created a need for increased identity construction and control. For that reason data collection, standardisation, storage and sharing practices, particularly regarding cross border transportation services constitute priorities of authorities worldwide.

Nevertheless, a primary international concern with implications on transportation service quality is the remaining digital divide both socially and spatially. Table 1 revisits this topic using selected rankings from the Economist Intelligence Unit and the Global Information Technology Report based on a mixture of factors such as connectivity, human capital, sophistication of use of ICT, geographical dispersion, legal and political considerations. These rankings show a clear distinction between levels of readiness between developed, emerging and developing countries. Another important point is that despite a decade of progress, several of the selected countries have not seriously advanced their global position, suggesting that a relative digital divide persists. The reasons for the digital divide are well documented in the academic literature and echo that of other socio-economic divides.

Table 1: Global Information Technology Report Rankings

	Sweden	**USA**	**India**	**Colombia**	**China**	**Haiti**	**Nigeria**
2013 *Out of 144 countries*	3	9	68	66	58	141	113
2008-2009 *Out of 134 countries*	2	3	54	64	46	n/a	92
2001-2002 *Out of 75 countries*	4	1	54	57	64	142	75

Source: (Bilbao-Osorio et al., 2013; Dutta and Mia, 2009; Kirkman et al., 2002)

Yet, expectations for emerging wireless and mobile technologies are high globally. Some observers conclude that several developing countries having bypassed landline phones will bypass the personal computer and 'leap-frog' straight to mobile internet. This is founded on the premise that mobile technology pledges improved opportunities for enhanced interconnectedness and transportation services to several social groups. Hitherto, R&D has not focused on population segments having joined the digital revolution at a slower pace who have low quality transportation and ICT infrastructure available. Other social impacts to address are unintended consequences of ICTs for transport, energy use inequalities and technological optimism bias, since it has been documented that it is not technology per se which matters the most, but the use of technology for the wider social benefit.

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Cross-references:
Emerging Technologies (planning and policy), Information Technologies (IT) and Transportation, Intelligent Transportation Systems (ITS), Telematics

Further readings:

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