Digital nomadism: students experience of using mobile devices in Delhi Metro

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Introduction and literature review

"Knowledge was once physically rooted in specific form (the manuscript, the book, the map), located in particular places (archives, museums and libraries) and embodied within the minds of certain people (scholars, archivists, mapmakers)" (Lyons and Urry, 2005). But knowledge is now transmitting into digitized information. In the era of mobile technologies, many social and economic aspects of life are transforming and that transformation has led to a positive change in our lives. If you walk onto any college or any park, waiting halls, moving trains you will see people will be busy with their mobile devices, composing, watching, reading, texting, listening to music or occupied on social media. Earlier, people would read a book or sometimes bury their faces in newspapers while travelling, but the modern internet-enabled mobile devices have made it possible to access information ubiquitously. Through mobile devices, information has become a part of our daily lives than in the case when we used to access information within the four walls of library. When ICT was a distant dream people on board of train would use print material, talk to fellow passengers or sleep. However, in the internet age, flood gates of knowledge and open access allow travelers to consume information on the go, and it has diminished the concept of disutility or dead time. Lyons and Urry (2005) found that "it is the train that can be the most potentially 'productive' mode of transport. Mobile ICT has been an important facilitator in this development. A number of modern technologies offer new opportunities for how people on the move may use their time beyond their workplace or home. The activity space has been expanded" (Gripsrud and Hjorthol, 2012). "Mobile computing and communication technologies, e.g. the new functionalities of the mobile phones, laptops, tablets, and wider wireless connectivity are all part of this development" (Gripsrud and Hjorthol, 2012). According to Schwanen and Kwan (2008), "smart devices are believed to not only change how time is spent during travel, but also change when, where, and how travel information is acquired and processed".

Importantly, the growing need to stay connected is the driver of increasing mobile use in the world today. This is true for people of different age groups and occupations. Students, which comprise the largest section of the total mobile device users, require high mobility and connectivity for many of their educational and recreational needs in India. The paper highlights the ways students use their time while commuting to different academic institutions in Delhi and back home with particular focus on the use of ICT and the kind of information available on mobile devices.

It is believed that, on an average, people spend more than two hours per day commuting and deep themselves busy in different activities Some reading newspapers others books and some sleeping or gossiping. Ohmori and Harata (2008) "observed that sleeping and reading as the most frequent activities; sleeping was at high rate of 67 per cent". "The traditional assumption that travel is a derived demand and travel time is wasted time that should be minimized is being challenged" (Guo *et al.*, 2015). From its early beginnings, "train travel has been associated with reading books; Victorian reading habits were significantly developed because of the huge growth of 'railway' reading materials following the appearance of book and newspaper stalls on most stations" (Urry, 2006). Ettema and Verschuren (2007) found that "travellers make positive use of time by undertaking many activities such as reading a book or listen to music". Mokhtarian and Solomon (2001) "found that more than 80 per cent of respondents agree with this statement: It is nice to be able to do errands on the way to or from work". "There is a big impact of ICT on commuting behavior; people do online shopping, make business arrangements allowing individuals to reduce the disruption of travel time by using mobile computing devices" (Mokhtarian and Chen, 2004). Lyons *et al.* (2007) "indicated that reading a book was the most popular activity among travellers".

Mobile technology can also impose new burdens on travellers and make travel less appealing in some ways" (Dal Fiore *et al.*, 2014). In the mobile age, "digital nomads" people are seen busy with their mobile devices, and there are clear signs that without mobile device travel is usually seen as a waste of time. Garikapati *et al.* (2016) note that "millennials are more inclined to multi-task than prior generations, and this may also play a role in the choice of mode as "digital natives" may value the ability to use technology platforms for a variety of purposes while traveling".

"Train passengers in Japan were found to be more likely to use mobile devices for work while sitting and would choose to use them for browsing the web when standing" (Ohmori and Harata, 2008). "Then there are mobile teleworkers who make best use of travel time by leveraging the power of mobile

devices for productive work. They are characterized as people who spend time travelling and/or working at different locations, who use ICTs in their work, whose work involves some level of knowledge intensity and communication with others either internal and/or external to their organization" (Daniels *et al*., 2001).

The fast advancement in mobile devices has helped students to study or seek information while commuting. Mobile devices have improved the performance of various activities like social contacts, consuming information, services and entertainment on the move. "Wider wireless connectivity in airports, trains and even planes have substantially transformed ser behavior". "The massive infusion of computing devices and rapidly improving Internet capabilities has altered the nature of higher education as well" (Motiwalla, 2007). Students are free to access information without the constraints of sitting in libraries or classrooms. Today, educational institutions are working to take full advantage of mobile technology. Students live in a mobile age, which has the power to make learning easier, creative and independent. Mobile devices give students freedom to learn anytime, anywhere. BYOD a practice of bringing your own device to learning spaces is being promoted in colleges and universities to provide students with access to learning materials. In Figure 1, students are seen busy using their mobile device while commuting on the Delhi Metro.

Mobile technologies provide users greater flexibility with respect to when, where, and how to take advantage of ICTs while traveling in our mobile information society (Raubal and Liu, 2012). Gripsrud and Hjorthol (2012) "find more than half of all commuters and 41 per cent of business travelers state that use of an electronic device during the journey makes the trip more worthwhile with an electronic device. While 10 per cent of respondents in their study considered travel time to be 'wasted time', a majority of travelers experienced increased value of travel as a result of ICT use" (Dal Fiore *et al*., 2014).

"The widespread availability of smart devices has made it easy for individuals to accomplish work-related tasks while on the bus, on the metro, or in the car, allowing passengers to create their own 'mobile offices' while traveling" (Lyons and Urry, 2005). The greater connectivity and ubiquitous nature of such devices, particularly, smartphones allow daily commuting students to stay connected with family, friends and colleagues. The reason of mobile devices pervasiveness is their manifold features. "Mobile devices can run increasingly complex software, interact with cloud services, play rich multimedia content, and allow for advanced user interactivity. New hardware and technologies such as Bluetooth, accelerometers, and multi-touch screens, as well as text messaging, smartphone software applications, mobile websites, global positioning systems (GPS), Wi-Fi and media creation and capture tools, are all part of the mobile environment. Many of today's mobile devices are increasingly 'always on' that is, by default meant to be connected to a wireless network" (Vollmer, 2010). India has about 300-400 million smartphone users (Counterpoint Research, 2017). "The number of Internet users in India is expected to reach 450-465 million" (Internet and Mobile Association of India: IAMAI, 2017). University students have been very quick to adopt mobile devices to access the information they need. They regularly check emails, record videos, etc., as they move through their daily schedule. The purpose of this study was to understand university student's use of mobile devices for educational purposes while commuting.

Figure 1. *Students busy consuming information of their need in Delhi Metro*

Source: www.dqweek.com/delhi-metro-launches-free-wi-fi/

Delhi Metro

> The Delhi Metro is an intra-city train system serving Delhi and satellite cities; Faridabad, Noida, Gurgaon and Ghaziabad. It is known for its world class standards with regard to safety, reliability, punctuality, and comfort. Presently, the Delhi Metro network consists of about 252 Km with 185 stations. With the opening of the Majlis Park to Durgabhai Deshmukh South Campus Sections, new age trains equipped with Unattended Train Operation (UTO) technology has been introduced. These trains operate with the Communication Based Train Control (CBTC) signaling technology which facilitates movement of trains in very short frequencies. The DMRC today has 266 train sets of four, six and eight coaches. More than a hundred trains of six coach configuration and over 60 trains of eight coach configuration are currently operational (DMRC, 2018).
>
> DMRC has also been certified by the United Nations as the first Metro Rail and Rail based system in the world to be carbon neutral for reducing Green House gas emissions as it has helped to reduce pollution levels in the city by 6.3 lakh tons each year. Apart from providing commuters with a comfortable public transport experience the Delhi Metro is also contributing significantly towards controlling pollution as well as reducing vehicular congestion on the roads. According to a study, Delhi Metro has helped in removing about seven lakh vehicles from the streets of Delhi (DMRC, 2018).

The Delhi Metro has served many purposes to university students in Delhi since its beginning. Recent expansion has covered Jamia Millia Islamia and the South Campus and other colleges of Delhi University. On the metro, students undertake many activities, namely, reading a book/newspaper, listen to course lectures, emailing and social media. To enhance these tasks, the Delhi Metro has launched a high speed free Wi-Fi facility on some of its lines. Experts believe "passengers will be able to use all standard Internet applications inside the station premises like email, Face book, Google, video chat as well as live streaming of cricket and football matches, etc" (DMRC, 2017).

Data analysis

A survey was administered to students of different colleges and universities in Delhi who commuted daily and how they consume information while commuting back and forth to college during November and December 2017. In addition, a visit was made to different colleges and universities in Delhi. Of the 1,000 questionnaires, 820 were returned (a response rate of 82 per cent); so a good number of student commuters' population of Delhi was sampled. The age of the respondents varied between 19 and 30 years. The gender split was 537 males and 283 females. The respondents covered a range of categories including undergraduates, postgraduates and research scholars (Table I).

In terms of age, the "20-25" age group were more represented in the study followed by "below 19" age group. On average, female students underestimate the passage of time by 2.5 per cent, while male students tend to overestimate it by 10 per cent (Hancock and Rausch, 2009); it was also found that the perception of time was influenced by age, where older participant perceived time higher than actual (Yosritzal, 2014).

Table I.
Ages of respondents (N = 820)

Age	No.	(%)
Below 19	205	25.00
20-25 years	479	58.42
26-30 years	126	15.36
More than 30	10	01.22
Total	820	100

Figure 2 highlights that the education level of the respondents. We have chosen them to group in four categories. The postgraduates comprise the highest number of respondents (45.24 per cent) followed by undergraduates (35.86 per cent). The least represented group was post docs with only 0.24 per cent; so it is difficult to imply any significant results.

In our study, mobile devices included laptops, e-books, PDAs, tablets, smart phones and audio players. "Among various smart devices, smartphone popularity has increased dramatically with the advent of 3G and 4G iPhones. There has been a dramatic shift in mobile phone culture as smartphones continue to redefine traditional phone use" (Shin, 2012).

Table II shows the greatest number of the students (99 per cent) use smartphones. The age-wise split shows that 57.4 per cent are the age group of 20-25 years. The next indicted mobile device that students (most of them 20-25) are using is a laptop with 87.1 per cent use. The least mobile device that students use is a stand-alone e-book reader with only 12.9 per cent. It should be noted that students were asked about devices they have used rather than any they were currently using during the survey. Students tend to carry more than one mobile device for study related activities while travelling. Figure 3 highlights some of the core activities of surveyed students.

Figure 3 shows that mobile device is used for browsing the internet, communication, text messaging and accessing social media. Other activities that usually all of the surveyed respondents do are either watching movies/TV programs, listening to music or playing games. In total, 96.7 per cent of students reported that they browse the internet followed by 96.6 per cent who indicated that they use their mobile device for communication with their peers, teachers and family members. A fair proportion (89.6 per cent) of the students indicated that they send text messages including WhatsApp, whist on board. The other two important activities that are indicated by the significant number of the respondents are accessing social media (85.5 per cent) and listening to music (83.2 per cent).

The Delhi Metro enabled the common commuter to use travel time for productive work and that was possible only with mobile devices. Both saved the time and money of the commuters (Figure 4).

Figure 4 reveals that 30 per cent of respondents stated that their travel time is never productive; this could be due to some impediments that are mentioned in Figure 6. In total, 28 per cent noted that their travel time is often productive. A significant number of students indicted that their travel time depends upon internet connectivity. However, the Delhi Metro has launched a high-speed free Wi-Fi, but still the problem of internet connectivity is a big issue of commuters. Personal engagement activities included enjoying the view, sleeping and thinking. Being bored or anxious is included in personal activities (Yosritzal, 2014).

Figure 5 shows that the most frequent personal activity students have when commuting is "thinking". In total, 47.7 per cent indicated that they engage themselves in thinking on different issues that occupy their mind; 27.6 per cent prefer to "sleep or snooze" while travelling, but it depends on the availability of having a seat; 14.6 per cent feel "bored" and 10 per cent spent their time in praying and reading or singing religious hymns.

Respondents were asked to report the impediments they face while travelling (Figure 6). Travel time can sometimes change into unproductive time if the students were not comfortable or there is some technical problem in the train.

Figure 2. *Educational qualification of respondents (N = 820)*

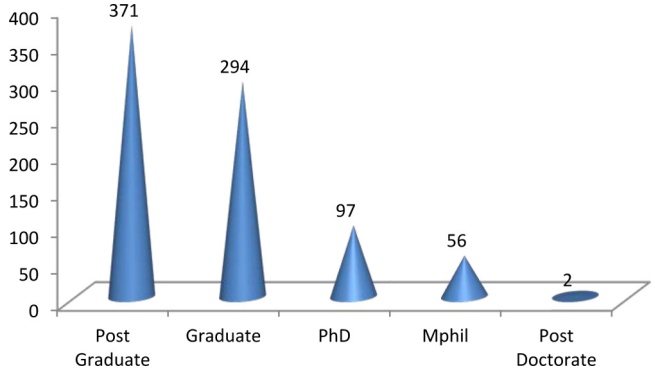


Table II.
Use of mobile devices

Mobile device(s)	Age	Use
Smartphone	Below 19	204 (24.9%)
	20-25	471 (57.4%)
	26-30	125 (15.2%)
	More than 30	10 (1.2%)
	Total	810 (99%)
Laptop	Below 19	172 (12%)
	20-25	419 (51.1%)
	26-30	115 (14%)
	More than 30	8 (1%)
	Total	714 (87.1%)
Tablets	Below 19	44 (5.4%)
	20-25	116 (14.1%)
	26-30	17 (2.1%)
	More than 30	2 (0.2%)
	Total	179 (21.8%)
e-Book readers	Below 19	20 (2.4%)
	20-25	66 (8%)
	26-30	18 (2.2%)
	More than 30	2 (0.2%)
	Total	106 (12.9%)
Other such as audio devices	Below 19	8 (1%)
	20-25	32 (3.9%)
	26-30	5 (0.6%)
	More than 30	0 (0%)
	Total	45 (5.5%)

Figure 3. *General uses of mobile devices (N = 820)*

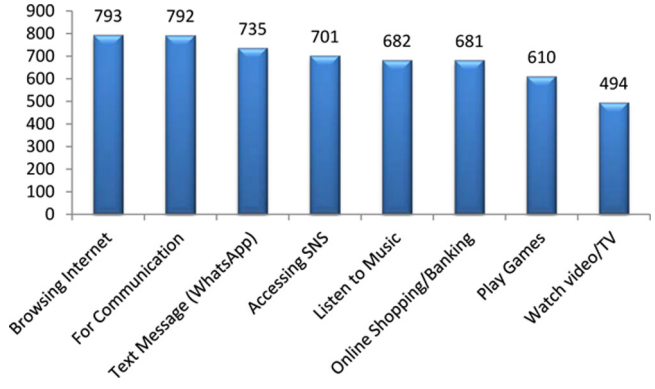


Figure 6 shows that the highly rated impediments faced by students while travelling in Delhi Metro are "poor Wi-Fi", "noise and overload" and "too much vibration and rolling" during travel indicted by 72.3, 68.9 and 68.8 per cent, respectively. A considerable number of respondents face no obstacle in accessing information while travelling to the desired destination in metro.

Concluding remarks

The growing need for high mobility and to stay connected is the prime driver of increasing mobile use in the world today. Students which comprise the largest number of users of mobile devices require high mobility and connectivity for their educational and recreational needs. The study examined the use of travel time by the students of Delhi (universities) while commuting using the metro on a daily basis. The mobility and ubiquity has triggered the growth of mobile use while travelling to different places daily. The Delhi Metro undoubtedly is a very affordable service to the common traveller especially students. Students do a number of activities like reading online books, using SNSs and ICT for different academic activities. The results of the study highlight different categories of students' use of mobile devices and their interest in using travel time in a satisfactory way. With respect to information access-related activities, as a whole, browsing the internet and communication like emailing and texting to peers and use of social media were noted by a significant number of students; a considerable number of students are of the opinion that their travelling time is productive in Delhi Metro than in other modes of transportation. A significant number of students reported that besides accessing online information, the students also use their travel time in some personal engagements. Personal engagement activities are those that can be conducted without involving other passengers or any devices such as enjoying the view, sleeping and thinking, as well as boredom and anxiety (Yosritzal, 2014).

Of all the engagements, most time is consumed on thinking; social, personal and educational and political issues. The students complained some impediments they face daily while travelling to their desired destinations. Some of the significant among them are noise and overload, vibration and rolling and lack of internet/Wi-Fi access. In conclusion, travelling on the metro helps students in accessing information and makes the best use of their travel time. Providing hassle-free personal space, more privacy, internet and charging facilities make the travel more productive than in other modes of transportation. This work addresses gaps in value of time and by providing a novel way of exploring the data generated by commuters travelling Delhi Metrorail. This study is probably indicative of other studies that may be made on digital nomads commuting in other cities around the world.

Figure 4. *Value of time (N = 820)*

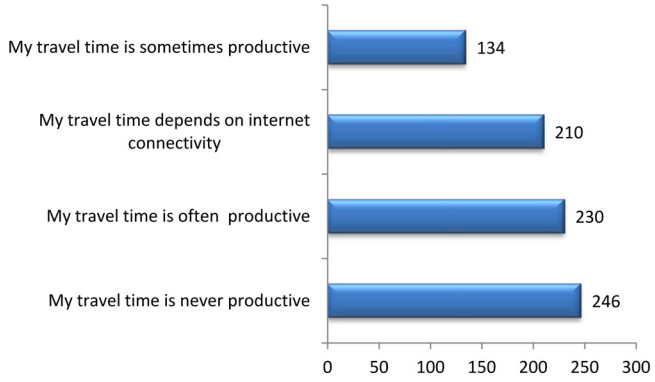


Figure 5. *Personal engagements while travelling (N = 820)*

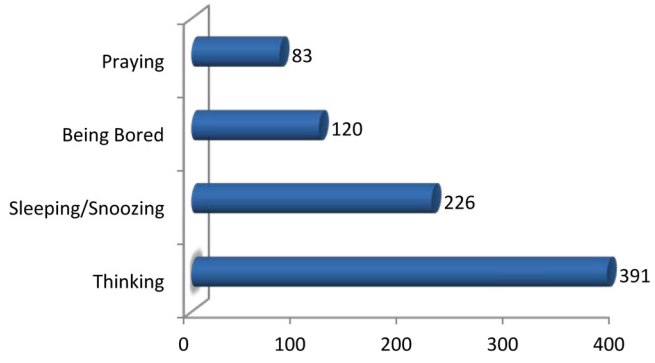
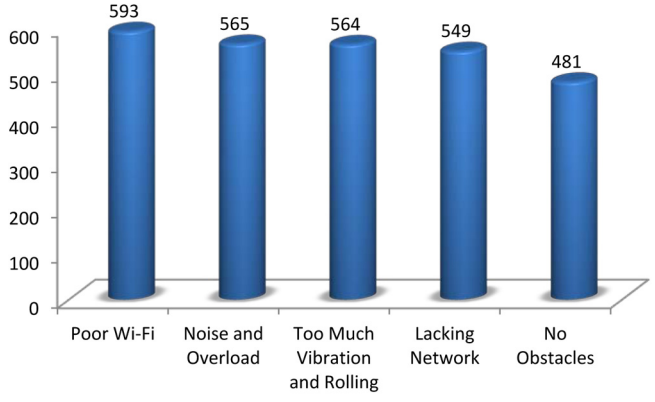


Figure 6. *Types of impediments (N = 820)*



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