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Multitasking on the go: an observation study on the Brussels public transport

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Abstract

Nowadays, performing multitasking activities on the move while travelling has become more and more popular. Such propensity has increasingly attracted lots of attentions from scholars. In this streamline, the thesis is to explore how multitasking activities are performed in different modes of public transport in Brussels city, and whether or not they are affected by the demographics, distance and level of crowdedness factors. In addition, it takes into consideration of the way and how frequently PT passengers interact with their information and communication technology (ICT) devices. Structured observation is used to conduct the survey of 1216 PT passengers (on bus, tram and metro) in May 2016. The result shows, on the one hand, that the length of the journey, demographics have significant impact on passengers' decision to multitask. On the other hand, it further proves that the frequency of using ICTs not only being influenced by demographics, but its relationship with the transport types (metro, bus or tram) is also moderated by crowdedness.

On top of that, a detailed comparison with a previous study which adopts a different methodology but in the same context is conducted both to confirm the reliability and validity of this paper and to give an insight about Brussels public transport and its users' multitasking tendency. Moreover, clashing points between the two researches raise a need for further studies of the same interest. A combination of both field work to observe the manifest behaviors and questionnaire could be a promising methodology for future researchers.

Besides, findings from this study suggest that ICTs increasingly place a noticeable influence on the propensity of performing multitasking on the go. As such, having a better perspective of how passengers riding on public transport use their time while travelling and the extent that they interact with ICTs might open a new horizon for policy makers to improve their service quality and retain customers' satisfactions.

Acknowledgement

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List of Abbreviations

ICT	Information Communication Technology
ICTs	Information Communication Technologies
PT	Public transport
BELDAM	Belgian Daily Mobility
STIB	Société des Transports Intercommunaux de Bruxelles
IBST	Institut Bruxellois de Statistique et d'Analyse
OLS	Ordinary Least Squares
MLE	Maximum Likelihood Estimation

Chapter 1
Introduction

1.1. Background

Regardless of working or studying, the commute to and from the workplace or school is an indispensable part of people's daily time use. Previous researches consider the work commute as one of the least appreciated daily activities (Kahneman, Krueger, Schkade, Schwarz, & Stone, 2004) with respect to emotional well-being. This finding corresponds to many other conventional studies which usually claim that travel time spent is unproductive and wasted (Vilhelmson, Thulin, & Fahlén, 2011). Nevertheless, this assumption is increasingly challenged by recent researchers suggesting that activities during travelling can make travel time productive and pleasant, enjoyable or at least less boring. Activities associated to travel time can be divided into three distinguishable categories (1) activities can be undertaken at the destinations, (2) activities can be performed simultaneously while travelling and (3) the nature of travelling activity itself (Mokhtarian & Salomon, 2001, p. 701). Whereas there have been a number of studies concerning the activities available at the destinations, the second category still attracts researchers' interest in order to further explore whether or not and how multitasking plays its role on the positive (less negative) impacts on the travel time use, especially with the support of information and communications technologies (ICTs). The third component will not be within the scope of this research.

Brussels-Capital Region, the heart of Belgium and Europe with the diversification of languages and nationalities where a large number of European institutes and organizations are situated, has increasingly placed a significant need in travelling by the public transport (PT). By 2014, the Société des Transports Intercommunaux de Bruxelles (STIB) reported that the number of public transport users has risen continuously for more than 15 years (*Activity Report*, 2014). Details are illustrated in Figure 1. Such potential conditions, combined with the fact that there is still a shortage of researches conducted with regard to in-vehicle time use in this region, attracts the author's attention and encourages him to choose Brussels as the base location to carry out his further study.

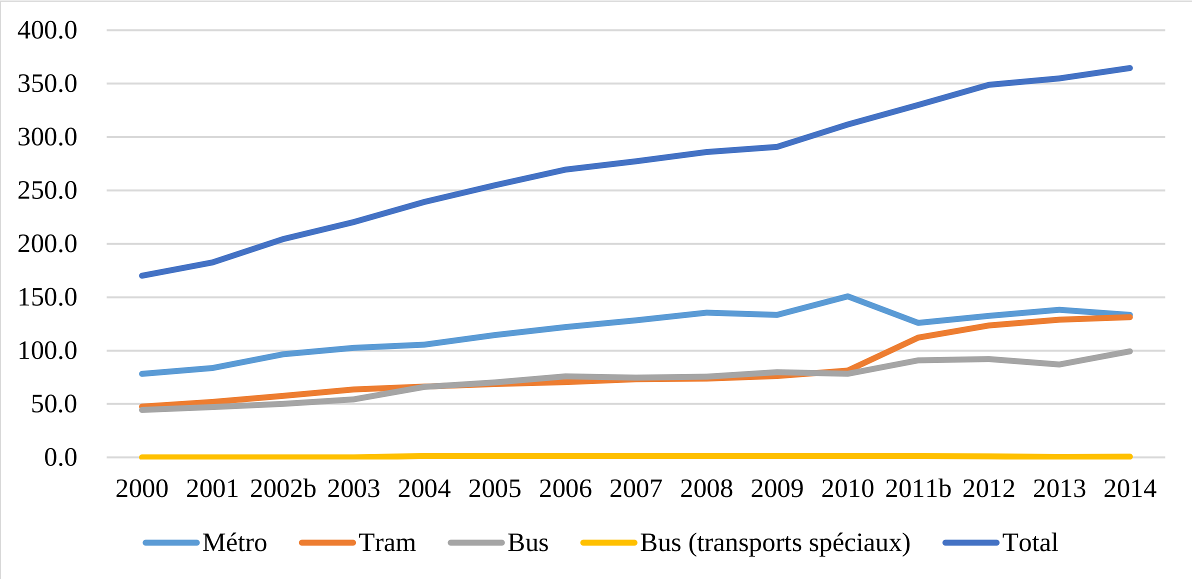


Figure 1. Ridership in Brussels 2000-2014 (Sources: STIB, IBSA)

In short, the main aim of this thesis to explore how individuals maximize their time use while riding on public transport (namely bus, tram and metro) through multitasking activities in the city of Brussels.

1.2. Research questions

In relation to the gaps found in the existing literature in general and Brussels-Capital Region specifically (chapter 2), the research is to answer the following:

- Is there any relationship between demographic, distance or crowdedness factors and PT passengers' decision to multitask while travelling in daily basis? If yes, to what extent do those factors influence the multitasking behaviors of PT users and how they experience those activities?
- Which are the major multitasking activities? What are the popular ICTs devices that passengers carry along and how interactions take place in relation to those devices?
- Is there a linkage between passengers' behaviors with regard to the different modes of transport? In other words, will the passengers travel by buses, trams and metros behave in different ways?
- Will the findings help enhance transport experience by offering the transport operators chances to improve their in-vehicle utilities or policies?

1.3. Structure of the thesis

Chapter 2 focuses on the overview of literature to study the origin of multitasking concept and its in-depth understanding. This chapter also highlights how travel time was evaluated in the past, how it is expected to be studied now and in the future as well as the role of multitasking activities amongst the public transport use. The existing situation of Brussels and why it is necessary to conduct a particular study in this region are also discussed here.

Chapter 3 continues with research design comprising research technique, methodology, population and sampling, data collection, pilot study and other significant factors. Moreover, the degree of reliability and validity is also expressed. This chapter is the core of the study designing how observations are organized on different modes of transport (bus, tram, metro) and how data are collected and processed accordingly.

Chapter 4 discusses the analyzed results.

Chapter 5 is to conclude the findings of this research, link them to the theoretical literatures as well as conduct the direct comparison with the results drawn from previous studies. The chapter is also to include solution recommendations to the public transport operations and policies. Besides, limitations of the study, together with possible studies or research expansions will be discussed further in this chapter as well.

Chapter 2
Literature Review

2.1. Value of travel time

On the need of economical appraisals and policies for infrastructure and transport, evaluation of travel time plays an important role. Previous scholars conduct several studies on how to value travel time which is conceptually considered, as acceptably with no doubt, only bringing negative effect. ‘‘Travel time savings are the single most important component in the measured transport benefits /dis-benefits of most schemes and policies. Hence, the methods of valuing them critically affect the measurement of the economic impacts of schemes’’ (SACTRA, 1999, p. 196). The importance of how travel time is counted in the appraisal of transport schemes has been the key determinant for several years in Great Britain, which led to many researches to evaluate the monetary value of travel time savings (Wardman, 1998; Abrantes & Wardman, 2011; Mackie et al., 2003). On the streamline of those who focus on the monetary value of travel time, while Wardman (1998) argues “the opportunity cost of time spent travelling” and “the disutility time spent travelling” are two components making up the “variation in value of travel time” (p. 310); Mackie et al. (2003), based on meta-analysis, finds the difference and relations different modes of transport. They both conclude the relation between distance and value of time; and recommend other forms of time (“walking time, waiting time, late time, search time, delay time and travel time variability, etc.”) should be taken into consideration also. Next to that, a study by Axhausen and Gärling (1992) develops frameworks and models on the “activity-based approach” (activity scheduling) questioning that “to what extent travelers are willing to substitute out-of-home with in-home activities, or, at least, to reschedule out-of-home activities and in this process possible switching the location and/or travel mode originally intended” (p. 323). Hess, Bierlaire, and Polak (2005) suggest, on the other hand, using the mixed-logit models to estimate the savings value of travel time. “Policy directed at the problem of urban congestion often attempts to reduce travel by increasing its cost (disutility) or by bringing destinations closer to origins” (Mokhtarian & Salomon, 2001, p. 696).

For years, travel is conventionally accepted, without many questions, to be necessary but unproductive and wasteful (Vilhelmson et al., 2011), considered functional only in their accessibility at the destinations reached (Kenyon & Lyons, 2007). Such grounded argument has remained unchanged for several years, supported by many studies from scholars. Stutzer and Frey (2008) report that the longer the commuting time is, the lower people's subjective well-being will be. They argue that many people consider time consuming for travelling between work and home is to "encompass stress that does not pay off" (p. 363). This corresponds to what Holley, Jain and Lyons (2008) claim that the most common underlying assumption by previous studies in the transport sector is that the only value of travel time spent is derived from "what is achieved or undertaken at the destination" (p. 29). In their previous study about the use of travel time by rail passengers in Great Britain (2006), they find, in the report of the Department of Transport (2000), that "travel time saved during working days is assumed to convert unproductive time to economically productive time" (pp. 107-108). Besides, time spent travelling during non-working day is also considered as a disutility. Considering travel time as the cost incurred by individuals and society in relation to what is undertaken at the journey end destination is still the mainstream of studies for several years.

Despite traditional researchers claim travel time usually attaches to disutility and unproductive activities, many studies to date argue otherwise. Mokhtarian and Salomon (2001) contest the disutility travel concept by arguing that travel or excessive travel should not be considered at the destination per se but under the combination of three elements: (1) "the activities conducted at the destination", (2) "activities that can be conducted while travelling" and (3) "the activity of travelling itself" (p. 701). Their argument stays strong with the support of empirical evidences analyzed from the mail-back questionnaire data collected from about 1900 residents in the San Francisco Bay Area. Taking the point (2) into consideration, evidence in their study shows that nearly 50% disagree that travel time is generally wasted, while more than "one third see their commute trip as a useful transition and use such time in a productive way" (p. 709). Concerning the value of the travelling activity itself, point (3), two third of their respondents again share the same ground by disagreeing with the statement "the only good thing about travelling is arriving at your destination" (p. 709). About half of them agree "getting there is half the fun" (p. 709). Interestingly, such statement leads to another research conducted by Mokhtarian and Ory (2005). Again, Mokhtarian and her colleagues can raise a firm voice that travel per se has its own intrinsic characteristic; and there should be the element of fun associated with the travel itself even though the common phenomenon that travel comes from its derived demand still remains. By saying that, it is very often the case that people travel because they need to get to the destination or because of things that they want to do at the destinations; other people, however, may want to travel because simply of the reason "taking the car out for a spin" (Mokhtarian & Salomon, 2001, p. 697). Such finding is furthermore supported by a study from Handy, Weston, and Mokhtarian (2005) who look for empirical evidence of excess driving. Interestingly, the same conclusion is made that the value of activities taking place while driving outweighs that of driving itself. Several activities, which relate to the element of fun or relaxation, can be done while driving, such as: sight-seeing, listening to radio/tapes, communicating on phones, etc. Following the same paradigm, a combination of driving itself, activities while driving, other components like "variety seeking", habit, etc. are the main elements that generate the value of travel and lead to "excess driving". (Mokhtarian, Salomon, & Redmond, 2001). In short, the introduced utility concept of travel time attracts scholars' attentions increasingly (see also Anable & Gatersleben, 2005; Lyons, Jain, & Holley, 2007).

2.2. Multitasking on the move

The term "multitasking" in the time use was introduced by (Ironmonger, 2003) referring to "simultaneous activities, or overlapping activities, concurrent activities, parallel activities, primary and secondary activities" and was considered as double counting of time (Kenyon & Lyons, 2007). To be precise, Keyon and Lyons (2007) define multitasking as "the simultaneous conduct of two or more activities during a given time period" (p. 162). Circella, Mokhtarian, and Poff (2012), likewise, describe multitasking refers to the state that people behave multiple tasks at the same time, either "sequentially", "interleaved" or "simultaneously".

Back to 1990s, on one hand, according to the activity-based approach, Bhat and Koppelman (1999) state that "individuals have 24 hours in a day (or multiples of 24 hours for longer periods of time) and decide how to use that time among activities and travel (and with whom) subject to their schedule, socio-demographic, locational and other contextual constraints" (p. 120). In other words, it is suggested that "individuals have the same finite number of minutes in the day and, in so doing, implicitly suggest that time is the great equalizer – whilst we can buy and sell the use of time, in the form of labor, we can neither buy nor sell time itself" (Kenyon & Lyons, 2007, p. 162). On the other hand, it is claimed by Kenyon & Lyons (2007) that individuals can use more than 24 hours per day, effectively by creating more time through multitasking activities, which allows individuals to re-allocate their participation in a way that is more either passively or actively efficient. Kenyon and Lyons (2007) reports that “multitasking ‘adds’ almost seven hours to each day, totaling an addition of more than 48 hours to the average week”, which is equal to an approximation of extra 46% to each waking day (p.168).

Linking the multitasking activities to travelling, one may come up with the question: if you are the working person who has to commute every day to work, and you normally spend two hours listening to music or surfing the internet when you are already at home, why do you not do that on the way back and you may have two hours savings that you can do something much more productive or just play around with your beloved family? To find the satisfied answer for such question is not “a piece of cake” task since it would also depend on the contextual characteristics and that person’s personality and desired motive as well. However, from that simple example, we can see there is a great deal of potential to discover the role of multitasking activities while being on the move, either to have more productive or enjoyable hours per day or to reduce the wasted proportion of one’s fixed 24 hours. Hence, it is no surprise that many scholars now study seriously on this particular field and try to link their findings to the appraisals and policies of transport.

Several activities can be done whilst travelling. A common list of activities can be traced back to the findings of Lyons and Urry (2005), Russell et al. (2011), Ohmori and Harata, (2008), Ono, Ohmori, Takami, and Harata (n.d.), Lyons and Kenyon (2004) and Keseru et al. (2015). Central to that are listening to music/radio, talking/communicating over the phone or with other passengers, messaging, reading (on public transport) or eating/drinking, etc. Verschuren and Ettema (2007) claim that in the travelling context, by performing more than one activities, multitasking can help one complete his or her tasks more efficiently; or multitasking, which is considered as secondary activities, might also make a primary activity less boring and even more pleasant, for instance when combining it with listening to music or reading (on public transport). Moreover, the impact of loss time due to delay, traffic congestion, route interruption might become less serious with the presence of other enjoyable or productive activities while waiting (Verschuren & Ettema, 2007).

Investigating deeper the case of public transport in comparison with other modes, Ettema, Alexander, and Hagen (2010) find that the way people perform multitasking activities in public transport and in other modes are not the same due to the fact that they do not need the involvement of driving or navigation which enables them to have more time and space for other activities. They report there is no significant difference in the proportion of passengers on train, bus, tram and metro involving in verbal conversation with other passengers; in addition, passengers are more likely to allocate their travel time to either work or read. Such involvement is again confirmed by the studies of UK railway, while Lyons et al. (2007) find that just over 50% studied rail passengers spend some of their time for “reading for leisure”, Watts and Urry (2008) conclude 34% of their studied passengers dedicate their travel time for the same activity, that of Russell et al. (2011) takes up 21.7% overall on both bus and train. Interestingly, Russell et al. (2011), with research conducted on the mean of bus and train, report that two third of passengers spend “some of their travel time looking ahead or out the window (65.3%), but this was seen more on the bus (76.5% of bus passengers) than on the train, where just over half of train passengers (56.6%) were looking ahead or out at some point during the observation” (p. 134).

One thing to note that the same multitasking behaviors does not necessarily need to be understood in the same way. Whereas Bull (2000) finds that people may listen to music en route just because that is the only moment of the day that they can have time to listen to music, others may find such kind of activity just for relaxation (Verschuren & Ettema, 2007) or killing dead time (Zerubavel, 1985).

One indispensable element among multitasking activities contributing to the added value of travel time is the engagement of ICT devices. With the research focusing on the influence of mobile technology accessibility on the mobility, Perry, O’Hara, Sellen, Harper, and Brown (2001) conduct their study on how to work on “dead time” or in other words, how to work on the move to the meetings between offices with the support of mobile technology. Although they focus on the niche study of mobile workers only, the role of ICTs with regard to doing multitasks remains significant. Lyons and Urry (2005), on the other hand, are interested in the benefits as well as enhancements of ICTs to mobility “in the information age”. Besides providing the undeniable advantages of ICTs (mobile communication, “personalized cinema” with portable DVD player, etc.), they come up with the interesting question whether the presence of modern ICTs is the enhancements or substitutes only.

In the Brussels context, the number of studies in this particular research field seems still limited and most of the cases, combined with the engagement of studying on the impact of ICT devices. Keseru et al. (2015) conduct the study to evaluate how people value their travel time on a wide range of transport modes collected by the time survey data. The findings show that media related and conversation activities together take up more than 90% of all studied auxiliary activities. Proportion of women involved in conversation is more than that of men with regard to gender and media related activities taking lead in most trips regardless of trip purposes. Another research (Patriarche, Hubert, Montulet, & Berzin, 2008), also conducted in Brussels, targets the young adults living in Brussels city who equip themselves with portable ICT devices to have a comprehensive understanding of the relation between everyday mobility and the sense of media and ICTs related. Six years later, Patriarche and Huynen (2014) carry out a new research discussing the results extracted from Belgian national survey (BELDAM) concerning the mobility of entire population. The main scope of their study is narrowed down with intention to discuss the contextual setting of Brussels only, with the consideration of full range of transport comprising not only bus, tram or metro but also "walking", train and driving (both driver and passenger). Their findings appear that mobile activities play differently depending on not only modes transport but social configuration (for instance: gender) also. The particular figures focus on the specific scale of public transport will be presented in chapter 5 in comparison with the author's findings.

Apart from the above, a few other researches exist, but it seems there is still a shortage of studies in this particular area for the diversified city like Brussels, where the number of ridership by public transport increases every year (STIB). This thesis aims not only to understand the social behaviors of PT passengers, enhance the existing literature with regard to ICTs; but also, on the other hand, to narrow the supply-demand gap between number of theoretical studies in comparison with the hectic pace of public transport development; and then contribute its knowledge and findings to shape the appraisal and/or policies of public transport systems if possible.

Moreover, while the previous study from Patriarche and Huynen (2014) bases their study on the survey data using questionnaire which, in no doubt, might reveal a large quantifiable data to perform the analysis. However, there is no absolute guarantee that such survey data are completely accurate due to several constrains associated with the questionnaire survey method especially when applying in the social research field. Most of the cases, those issues are mainly due to "problem of meaning, omission, memory, social desirability effect", or “problem of question threat” and particularly the gap between what respondents behave in reality and what they might report in the survey (Bryman, 2015, p. 271). Hence, with the intention of using structured observation on field, measuring the actual manifest behaviors of PT users, the study in this thesis might be used as reference to test against the validity of the findings concluded in past studies. The combination of them might shed light on future improvements of public transport system which bring added value to its customers’ experience and enhance their satisfactions.

In the next chapter, research design is presented as the core of this thesis.

Chapter 3
Research Design

3.1. Technique

Numerous different techniques can be adopted to investigate the social behaviors of transport users and record their activities, comprising: “self-completion” questionnaires (Ettema & Verschuren, 2010; Keseru et al., 2015; Lyons et al., 2007; Mokhtarian, Papon, Goulard, & Diana, 2014; Mokhtarian & Salomon, 2001; Ono et al., n.d.), travel diaries (Lyons & Kenyon, 2004), interviews (Perry et al., 2001) or focus group interviews (Jain & Lyons, 2008) and in-field observation (Russell, 2011; Russell et al., 2011).

While questionnaires and interviews have the common post hoc issues in which people may forget some certain details of their past trips (Yosritzal, 2014), or the “gap between stated and actual behavior” meaning that what people say “how they are likely to behave and how they actually behave may be inconsistent” (Bryman, 2015, p.271), or “conventional diaries often neglect auxiliary activities” (Keseru et al., 2015). Similarly, observational study has its own disadvantages. Russell (2011) claims that the most noticeable problem with observational study is that it can only record people’s manifest behaviors without knowing their subjective motivation, experience, feelings, preferences, etc. In addition, she also emphasizes consistency between multi-observers and fatigue over time are other issues. Nevertheless, direct observation has a number of advantages providing the excellence for social behavioral study. Russell (2011) summarizes:

> Key reasons for employing such methods include that: it is an unobtrusive method (takes place in public; there are few ethical issues, e.g. no need for personal consents unless using video/ photographic/ audio recording); it takes place in a ‘natural setting’; passengers generally do not know they are being observed and they behave naturally; it can yield a large amount of robust quantitative data in a relatively short time; it provides an excellent familiarization with public transport by getting the researcher out into the field and examining behaviors and environments in a methodical way; it avoids the subjectivity and recall bias of data obtained through survey and interview methods and travel diaries; It is fairly economical, and it can provide snapshots of behavior or it can provide longitudinal data about passengers on a trip or series of trips (p. 3).

Bryman (2015, p. 273) classifies that the direct observation technique can be formed in different types with regard to their purposes, namely: participant observation, non-participant observation, unstructured observation, simple observation and contrived observation, and structured (systematic) observation. To collect the large and consistent amounts of quantifiable data, the last technique is used under the scope of this study.

In addition, logistic regression is selected as the quantitative technique to analyze and process gathered data. This method seems to be the most suitable analysis technique for dichotomous variables. The main concept of this type of regression is to estimate the probability that an event happens or the so-called "probability of success". Taking into consideration the dependent variables are coded into two values which represent two possibilities: 1 if the observed passenger performs a specific type of multitasking, and zero if he or she does not. The dependent variable itself is binary and has the following form:

$$Y_i = \begin{cases} 1 \text{ if the i}^{\text{th}} \text{ passenger perform a certain multitask} \\ 0 \text{ if otherwise} \end{cases}$$

A benefit of logistic regression is that it is easy to interpret and the result is very clear-cut with regard to the occurrence probability of an event. Furthermore, logistic regression has several advantages over the ordinary least squares (OLS) technique as it enjoys less assumption requirements. For instance, it does not ask for constant error terms and heteroscedasticity is not a great concern as well. The collinearity between dependent and independent variables also does not matter.

Nevertheless, logistic regression per se still has its own disadvantage which is the dataset must be large enough to generate good results as it adopts the maximum likelihood estimation (MLE) to calculate the parameters. Upon acknowledging such characteristics, the author believes that with the size of 1216 observational units, the dataset presented in this paper is sufficient for analysis purpose.

3.2. Method

3.2.1. Observation design

Russell (2011) concludes a structured observation study of PT passengers require four key elements: (1) "population and sampling", (2) "categories", (3) "data collection" and (4) "analysis and reporting" (p. 1). The first three elements are discussed in this section, while the last one will be described in the next chapter. Designs of the four recent observations for the first two elements are summarized and compared in Table 1 below.

Table 1. Comparison between the recent four observation designs (Russell, 2011; Russell et al., 2011)

	Timmermans & Van der Waerden (2008)	**Ohmori & Harata (2008)**	**Thomas (2009)**	**Russell et al. (2011)**
Where to observe	On a particular line of the Bay Area Rapid Transport System San Francisco	Odakyu Support No 60 train from Machida to Shinjuku Station	Wellington, New Zealand	Wellington, New Zealand
When to observe	One day in June 2007 In the early morning peak, middle of the day and late afternoon.	11 weekdays in November-December 2003 6.30am to 7.04am on	Eight winter weekdays from 6.30am to 6.00pm	Nine days in November-December 2008, morning, evening, several nights & middle of the day
Who to observe	With demographic information, travel party, trip duration	Followed by demographic information asked in the survey in 2004	All passengers / half of the train carriage	All passengers
What to observe	Common activity checklist (reading newspaper, taking to other passengers, text messages, listening to music/radio, etc)	Common activity checklist	Common activity checklist	Common activity checklist
Sample size	161 on train	84 on train	1142 on bus 561 on train	353 on bus 459 on train

Similarly, this paper also starts with the idea of investigating the answers for the four key questions mentioned above.

Where to observe? The observation takes place in the heart of Brussels Capital Region.

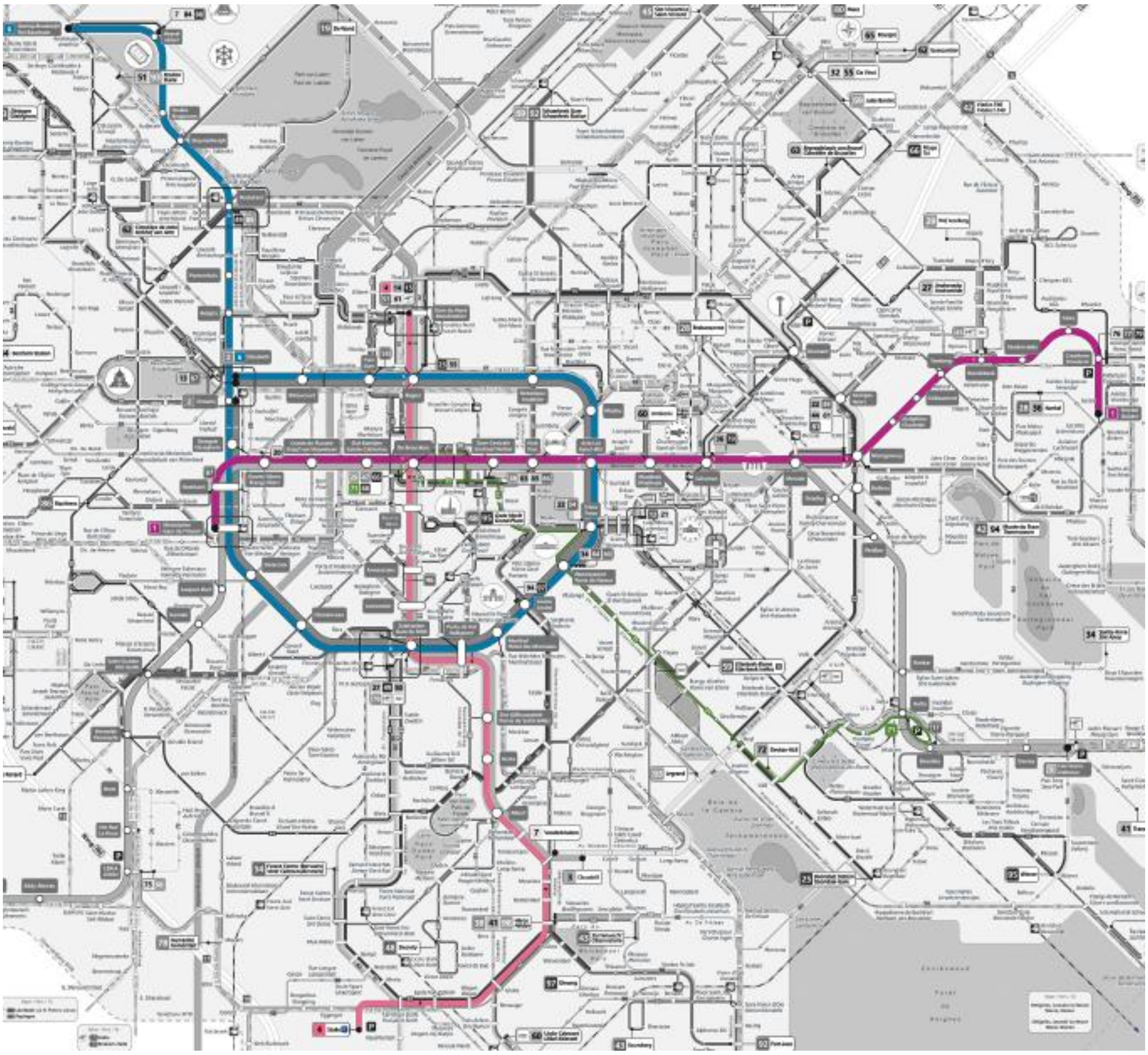
When to observe? Data is collected by the dedication of two observers (the author and co-observer) taking place continuously from May 3rd to May 8th 2016, from the late morning to late evening with the purpose to collect minimum 1155 passenger journeys in total.

Who to observe and what to observe? All passengers will be observed covering full range of gender, age and social groups. However, children are excluded from the study. Detailed checklists for each line of transport are enclosed in the appendix.

3.2.2. Justification for the selection of routes and observation timing

The routing selection on this study follows some core principles: (1) only pick up the line having more interactions and intersections with the major connection points along its way, where they attract more passengers with a variety of profiles, in order to enrich the input; (2) cover less number of lines but observe more repeatedly and collect more data on the same line to have a deeper understanding of behavior pattern. The author decides to focus mainly on four routes: one bus line, one tram line and two lines of the metro. Whereas the bus departs at De Brouckère, the center of the city, stop by many major connections before arriving Delta; tram line number 4 and metro line number 1 together will cross over the city horizontally and vertically; and the final metro line number 2 will cover the ring of Brussels center before arriving further to the North West of the city. Figure 2 shows the chosen lines on the PT map.

Experience learnt from the observation conducted in Wellington (New Zealand), Russell et al. (2011) raise the issue of observational field work that it "would be almost impossible to carry out, particularly at peak time" (p. 141). In addition, Ohmori and Harata (2008) share the same thought that "it would be difficult to conduct the on-board observation in highly congested normal trains where the seats are full and many passengers are standing" (p. 552). Inheriting the those lessons from the past, combined with personal experience of Brussels peak time congestion in the early morning and late afternoon, the author decides to better avoid these periods of the day in order to stay away from the "overcrowdedness" and "overmovement" situations when observing. Furthermore, in such situations, the information gathered is less rich due to the fact that people might resist to perform extra activities while they do not even have enough space to stand. Therefore, data in this research is collected mostly between 10.00am to 4.00pm, then after the break of 2-3 hours, it restarts at around 6-7.00pm to 11.00pm.



Pink:	Metro line number 1	Blue:	Metro line number 2
Purple:	Tram line number 4	Green:	Bus line number 71

Figure 2. Observation lines

3.2.3. Observational rules

Some rules are also set before the official collection takes place. In general, each observational session will take place from terminal to terminal to record both individual and overall crowdedness levels for each trip per line. Two observers who collect data will have to choose the right spot when getting the vehicle. On the line 71 which is operated by the long bus, one observer will take notes for the area close to the front, while the remaining observer will take care more at the rear to avoid duplication. The best possible spot on bus is the high seats right next to the doors, which not only allow observers to have access to who get in or who get off, but also allow him or her to have a better overview when the objects move around. While on the tram line 4 and metro line 1, the selection of spots becomes easier because those lines are served by the newest vehicle with all seats are arranged along the two sides and it is completely possible to move freely from the front to the back of vehicle when necessary; choosing an observational spot on the metro line number 2 is more difficult. Each observer has to pick up one carriage and stand on that during the whole trip because metro line 2 is still served by the old vehicle in which the seat arrangement will obstruct the view of the observer when sitting.

3.3. Population and sampling

With the purpose to quickly collect the large amount of data in a short period of time, non-probability sampling design, particularly convenience sampling method is used in the study of this paper.

Upon acknowledging STIB published in their annual activity report of the year 2014 that 364.6 million journeys were made on its PT network including services of bus, tram and metro. Whereas 27% of total journeys is accounted for buses, that of metro and tram are 37% and 36% accordingly. Figure 3 gives an overview of the STIB network in 2014.

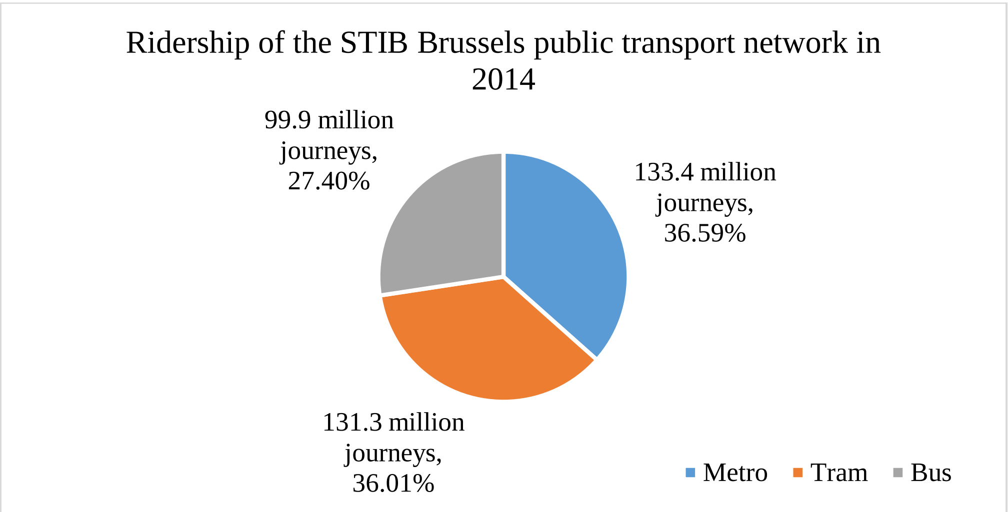


Figure 3. Ridership of STIB in Brussels by 2014

The overall population is divided into three separate subgroups. As a result, the representativeness of three different subsamples is also required accordingly. Each sample size is computed with the confidence level of 95% (z = 1.96), confidence interval of 5% and percentage of picking a choice p = 0.5 giving maximum value of sample size. Table 2 shows the result of individual sample size for each sub population. In total, 1216 actual objects are observed, which is deemed to be able to satisfy the requirement of minimum sample size.

Table 2. Calculation of subsample sizes

Formula	**Sample size**		
	Metro	Tram	Bus
Minimum sample size: $n = \frac{z^2 \times p \times (1-p)}{c^2}$	385	385	385
Actual collected	387	426	403

3.4. Data collection

The refined observational form is described in Figure 4.

OBSERVATION FORM

Date:	
Time:	

Line number:	**4**

From:	Gare du Nord
To:	Stalle

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	**Demographic**						**Distance & crowdedness**																					**No. of stops**	
	Range of age	**Gender**		**Group**																									
		Male	Female	Working people	Student	Unidentified	Gare du Nord	Rogier	De Brouckère	Bourse	Anneessens	Lemonnier	Gare du Midi	Porte de Hal	Parvis de Saint Gilles	Horta	Albert	Berkendael	Vanderkindere	Messidor	Boetendael	Héros	Globe	Wagon	Egide	Carrefour Stalle	Stalle	(to observe distance impact)	
Object 1																													**1**
Object 2																													**2**
Object 3																													**3**
Object 4																													**4**
Object 5																													**5**

S/N	**Passenger activity category**																	
	Leisure											**Normal conversation**		**Working**	**Studying**	**Children care/ Family care/ Personal**	**Frequency**		
	Reading		**Browsing on the internet or other e-devices related activities**		Listening to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	**Talking**					Interrupted use	Continuously use	
	News-paper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone						
Object 1																			**1**
Object 2																			**2**
Object 3																			**3**
Object 4																			**4**
Object 5																			**5**

Figure 4. Sample of designed observation checklist

Top left of the observational form records the date and time, followed by line number, direction and overall crowdedness. The lower table shows the demographic category, in which estimated range of age, gender (male or female) and groups (working people, student or unidentified) are taken notes, One of the most difficult tasks is to identify who belong to the working group and who are students. The classification into these two groups is only when the observers can see clear indications. For instance, people who wear formal suits or dresses with briefcase in hand, equipped themselves with working papers or documents will be considered under "working group". Likewise, those who equip themselves with back bag, most frequently getting in the vehicle at the stops near educational institutions, talking about educational life or studying on the vehicle themselves will belong to "students" category. In other cases without clear indicators, passengers will be recorded under "unidentified" category. The range of age is divided into sub-ranges, namely: less than 20, 20-30, 30-40, 40-50, 50-60 and larger than 60 years old. Children are not observed.

Next to demographic is the space reserved for distance and individual crowdedness. Name of stops is specified so that the observers can easily notice when a person gets in and gets off as well as the crowdedness of that specific stop. The length of his or her journey can be calculated based on number of stops in total that he or she is on the vehicle. On top of that, the route map is also placed right above of the stops' name enable observe to reduce error due to the confusion of languages if the stops have more than one name (in French and/or Dutch). Also, such information will allow the observers to pay more attention when the vehicle prepares to arrive at the major connection points along its line. Note that object number is placed both sides due to the reason mentioned in the pilot study (section 3.5)

For passenger activities, the author categorizes in the similar ways with Russell (2011) and Russell et al. (2011) but organizes them in a different layout. Overall, there are four main categories: leisure, normal conversation, working, studying, and caring (children, family and personal). At the furthest right, the column "frequency" with three attributes (no use at all, interrupted use and continuously use) aims to study the impacts of ICT devices on passengers' behaviors. On the checklist, the appearance of "no use at all" is not necessary because it can be automatically coded as long as no interaction takes place.

"Leisure has several sub-categories including reading (newspaper, book), browsing on the internet or other e-devices related activities, listening to music or radio, playing games, messaging, social media (facebooking, twittering, browsing Instagram), sleeping or taking a nap, eating or drinking and sub-category "doing nothing and/or gazing out of the window". While "conversation" comprising of either talking with other passengers in the vehicle or on the phone, "working" and "studying" have no sub-category. Next to that, category "children care/family care/personal care" is as well added in the checklist so as to track people who travel with kids or people travel with family (e.g. elderly, matured people with mental problem, etc.) and take care of them, or people travel on their own but spend time for personal care (e.g. make up, special care of face, hair, etc.).

The detailed observational checklists for each direction per route are enclosed in the appendixes. It is interesting that except the number of stops in metro line 6 are longer than the others (26 stops), that of bus line 71, tram line 4 and metro line 1 are exactly the same (21 stops).

3.5. Pilot study

To discover the unforeseen factors, two pilot trips on the bus 71 are conducted before launching the official observation study. The observers conducting pilot studies have a significant number of uncompleted data on these first two trips due to (1) unfamiliarity with the in-field work and (2) the design of the observation form is not optimal yet which does not allow the observer to keep track of people as quickly as possible. The first adaptation made is that the author separates the inbound and outbound forms to (1) allow the observer to be always able to track from the left to the right and (2) avoid the noticed issue that the number of inbound trip and outbound trip is not always equal and sometimes it happens the case that two inbound stops are either permanently or temporarily merged to an outbound stop when the bus runs in the opposite direction or vice versa. Second adaptation is related to how to record crowdedness level in a correct manner. In the preliminary design, the overall crowdedness is set with 3 different levels: uncrowded (less passengers than available seats), normal (just enough seats for passengers) and crowded (more passengers than seats). However, the case does not always hold true in the field because the bus tends to be less crowded at the departure and arrival terminals, whereas it is more crowded in the middle of its journey. Hence, besides the overall crowdedness, the author decides to supplement the individual crowdedness level for each stop along the line. The third refinement is related to numbering the object. Because the closer it is to the arrival terminal, the more difficult for the observer to track back to the first column at the far left to know who he or she is observing and what they are doing; the author added an extra object numbering column also on the right side of the observation form to allow the observer to take notes more quickly. In addition, "checking emails" is also one category to observe in the preliminary form; however, the author decides to combine it with the category "browsing on the internet and/or other e-devices related activities" because (1) it makes sense to combine and (2) no one checks emails in the first two observational sessions.

Also, during the pilot study, the observers find that people do not always travel alone, but in certain cases they travel in pair or in group. Therefore, observers agree that when such situations occur, they will also note down.

3.6. Reliability

3.6.1. Internal reliability

With an aim to guarantee the consistency in data collection and interpretation, taking into consideration that there are two observers for this research paper, the observers have discussed and got consent on way of collecting data, assigning values to variables before real observations to avoid any possible bias. Furthermore, reinforced by the two pilot sessions, the two observers hold a discussion to have the final consensus with regard to the consistency of both the formation of observation form and how data should be collected to eliminate discrepancies when more than one person participates on the data collection process.

3.6.2. External reliability

External reliability is related to "the degree to which a study can be replicated" (Bryman, 2015, p.390). This research is assumed to meet the replication criterion meaning that the results and conclusions would hold true if same studies are carried out. Due to the fact that the three sub-populations are too large, in order to re-test the external reliability, both adoptions of the same contextual concept and approaches with that of the author might be required.

3.7. Validity

3.7.1. Construct validity

Construct validity raises a concern of whether the measurement taken is adequate. In the context of this research paper, there is no ambiguous concepts and the issues are clearly defined. For each research question, a relevant variable is introduced to directly test any possible effect it has on passengers' behaviors or the way they multitask.

3.7.2. Internal validity

The research is assumed to guarantee the internal validity, which means the generated results could answer all the questions raised. As previously explained, a single variable is created closely corresponding to each objective in the realm of interest of this paper. The variables are not only to capture the effects of several well-specified factors on the passengers' behaviors, but also the way they interact and experience multitasking.

3.7.3. External validity

The study may have limitation with regard to external validity which means the generalization from the studied samples to the entire population might not be completely ensured. Such limitation is derived from the fact that (1) data are collected in six successive days so as to capture the snapshot of PT users' behaviors, which may differ in situations if data is gathered through a longer period; and (2) observational data, in reality, might be gathered differently in different seasons (seasonality impact) or if any special event takes place in the city.

3.8. Variables

3.8.1. Dependent variables

The dependent variables are binary with two assigned values: 1 when a specific multitask takes place and 0 when it does not. It is not relevant to integrate all multitasks under one dependent variable with various categories as each multitask is considered as an independent activity and the passengers can, at the same time, perform several multitasks during their journeys. For that, corresponding to the activities this paper desires to observe, there are 16 dependent variables, details are as follows:

1. Multitask1: Reading newspapers - the variable has the value of 1 when the studied passengers read newspaper during their journeys and equals 0 if they do not do so.
2. Multitask2: Reading books - the variable has the value of 1 when the studied passengers read books during their journeys and equals 0 if they do not do so.
3. Multitask3: Browsing or other phone related activities - the variable has the value of 1 when the studied passengers, interruptedly or continuously, surf the internet e to read news or checking emails by phone during their journeys and equals 0 if they do not do so.

4. Multitask4: Browsing on iPads/tablets or other iPad/tablet related activities - the variable has the value of 1 when the studied passengers, interruptedly or continuously, surf the internet by iPad or tablet to read news or check emails during their journeys and falls 0 if they do not do so.
5. Multitask5: Listening to music or radio - the variable has the value of 1 when the studied passengers, interruptedly or continuously, listen to music or radio during their journeys and falls 0 if they do not do so.
6. Multitask6: Playing games - the variable has the value of 1 when the studied passengers, interruptedly or continuously, play games on ICT devices during their journeys and falls 0 if they do not do so.
7. Multitask7: Messaging - the variable has the value of 1 when the studied passengers, interruptedly or continuously, message to other people during their journeys and falls 0 if they do not do so.
8. Multitask8: Social media - the variable has the value of 1 when the studied passengers, interruptedly or continuously, use Facebook, Twitter or Instagram, etc. during their journeys and falls 0 if they do not do so.
9. Multitask9: Sleeping or take a nap - the variable has the value of 1 when the studied passengers sleep or take a nap during their journeys and falls 0 if they do not do so.
10. Multitask10: Eating and/or drinking - the variable has the value of 1 when the studied passengers eat or drink or combine both activities during their journeys and falls 0 if they do not do so.
11. Multitask11: Doing nothing and/or gazing out of the window - the variable has the value of 1 when the studied passengers do nothing and/or gazing outside during their journeys and falls 0 when they do other multitasking activities.
12. Multitask12: Talking with other passengers - the variable has the value of 1 when the studied passengers have a conversation with other(s) during their journeys and falls 0 if they do not do so.
13. Multitask13: Talking on phone - the variable has the value of 1 when the studied passengers, interruptedly or continuously, have conversation on the phone during their journeys and falls 0 if they do not do so.

14. Multitask14: Working - the variable has the value of 1 when the studied passengers work and/or perform activities relating to work during their journeys and falls 0 if they do not do so.
15. Multitask15: Study - the variable has the value of 1 when the studied passengers study and/or perform activities relating to studying during their journeys and falls 0 if they do not do so.
16. Multitask16: Children or family or personal care - the variable has the value of 1 when the studied passengers take care of their kids, family or themselves during their journeys and falls 0 if they do not do so.

3.8.2. Independent variables

To test the effect of which factors really have an impact on the way the passengers multitask when travel on PT, five independent variables are created and taken into account, namely TranType, NumStop, OverCrowd, IndCrowd and TravelinGroup. The meaning assigned to each independent variable is as below:

1. TranType: this nominal variable has values of 1, 2 and 3 respectively assigned to metro, tram and bus.
2. NumStop: this is a discrete variable in which value equals to the total number of stops a specific passenger travels.
3. OverCrow: this is a continuous variable in which value equals to the average crowdedness of the entire trip. In which, the crowdedness of each individual station is coded from 1 to 3 which is respectively considered from uncrowded (there are more seats than passengers), normal (there are sufficient seats for passengers) to crowded (there are more passengers than provided seats).
4. IndiCrow: this is a continuous variable in which value equals to the average crowdedness of a specific passenger’s journey, taking into consideration only the stops he or she travels. The calculation and argument are the same as the OverCrowd variable.
5. TravelinGroup: this binary variable is assigned to 1 if the passengers travel in pair or in group; otherwise the value falls 0.

3.8.3. Control variables

Since the effect of an independent variable on the dependent variable may be constrained or enhanced by several characteristics associated with the studied object, the inclusion of control variables is in demand to help achieve more precise results retrieving from the regression analysis. In the context of this research, three control variables derived from the demographic pattern of the passengers are generated. Each variable is described as follows:

1. AgeRange: this variable depicts the age range of the studied passengers with six categories: 1 is for the passengers less than 20 years old, 2 for passengers within the age range 20-30, 3 for passengers within the age range 30-40, 4 for passengers within the age range 40-50, 5 for passengers within the age range 50-60 and finally 6 for passengers older than 60 years old.
2. Gender: the value of this binary variable is assigned to 1 if the passengers are male and 0 if the passengers are female.
3. ScGroup: there are three values with respect to three different social groups: 1 represents working people, 2 stands for students and 3 for unidentified passengers who belong to neither previous group.

3.8.4. Other variables

One of the purposes of this research is to provide the snapshot of to what extent ICT devices will place the impact on the passengers' multitasking behaviors. In order to manipulate that, variable "Frequency" (named "Frequen") is generated to measure how frequently passengers interact with their ICT devices. Three different values are assigned to this variable respectively: 0 means that the passengers do not use the ICTs at all, 1 means that the passengers interact interruptedly and 2 means they use the ICT devices continuously during the entire journey.

Furthermore, to have a holistic evaluation with regard to the distribution of passengers' behaviors, other three additional variables are made up aggregating single variables in groups with regard to their common characteristics. In which, the variable "Leisure" accounts for multitask 1 to multitask 11; the variable "Conversa" accounts for multitask 12 and multitask 13; the variable "WorkStu" accounts for multitask 14 and multitask 15.

1. Leisure: the variable has the value of 1 when the studied passengers have at least one leisure related activity, for instance listening to music/radio and/or reading

newspapers, ect. In other words, it takes 1 as long as the passengers have any activity under the range from multitask 1 to multitask 11 during their journeys; otherwise, the value falls 0 when they do not do so.

2. Conversa: the variable has the value of 1 when the studied passengers have conversation on phone and/or with other passengers during their journeys; otherwise, the value falls 0 when they do not do so.
3. WorkStu: the variable has the value of 1 when the studied passengers perform any activities relating to work and/or studying during their journeys; otherwise, the value falls 0 when they do not do so.

3.9. Fatigue

Russell (2011) emphasizes that observation is “not something you want to do all day”. Hence, she suggests to have a break of half an hour after four to five hours working continuously. However, what the author notices during the pilot trips on bus line 71 is that it is much better to have a sufficiently long break after four continuous observations (terminal to terminal). Otherwise, the tiredness and loss of concentration will occur. In general, the observers decide to have a break of two hours with at least one hour sleeping to recharge after every four continuous observation seasons to avoid such fatigue issue.

Chapter 4
Analysis and Result

4.1. Results

4.1.1. Descriptive statistics

Table 3 briefly describes the properties of a part of variables in the study. From the content expressed herein, on average the crowdedness of both entire trip and individual journey fluctuates in the range between uncrowded and normal state; however, it is closer to the side of normal state. It is also noted that the individual crowdedness appears to be higher than the overall crowdedness of the entire trip. PT passengers tend to travel approximately six stops on average, which may be considered as medium to long distance. The mean value of 3 combined with the standard deviation of 1.26 reflects the situation that more people at young generations travel on PT than elderly ones, represented by the range of age fluctuating from 20 to 40. Results also reveal that the involvement of ICTs related interactions has the propensity to be interrupted rather than continuously.

Table 3. Descriptive statistics

Variables	**Mean**	**Std. Deviation**
Crowdedness of the entire journey	1.6714	.46653
Crowdedness of the studied object's journey	1.8222	.74149
Number of stops the passenger travels	5.7656	4.13817
Object's age range	3.0008	1.26459
Frequency of using ICT	.4770	.73443

N = 1216

For dichotomous variables and the rest variables, the values are demonstrated in another table so that their characteristics are viewed in the most visible way. Table 4 illustrates that more people travel alone than travel in group or pair and the proportion of male and female passengers seems to be somewhat equivalent. In terms of social groups, there is a difficulty to distinguish whether passengers are working people or students unless there are the clear indications attached. As a result, the majority of social group belongs to category “unidentified”. Whereas “talking with other passengers”, “doing nothing and/or gazing out of the window”, "messaging” and “listening to music or radio” appears to be the most popular activities; in contrast, the activities “working”, “sleeping and/or take a nap”, “browsing on iPads, tablets” and “studying” are seldom performed.

Table 4. Frequency of multitasking activities and the remaining variables

Variables	Criteria	Frequency	%	Variables	Criteria	Frequency	%
Reading newspapers	No	1208	99.3	Sleeping/ take a nap	No	1214	99.8
	Yes	8	0.7		Yes	2	0.2
Reading books	No	1197	98.4	Eating /Drinking	No	1173	96.5
	Yes	19	1.6		Yes	43	3.5
Browsing on phone	No	1127	92.7	Doing nothing /gazing outside	No	867	71.3
	Yes	89	7.3		Yes	349	**28.7**
Browsing on ipads, tablets	No	1210	99.5	Talking with other passenger	No	754	62
	Yes	6	0.5		Yes	462	**38**
Listening to music/radio	No	1084	89.1	Taking on phone	No	1132	93.1
	Yes	132	**10.9**		Yes	84	6.9
Playing games	No	1208	99.3	Working	No	1214	99.8
	Yes	8	0.7		Yes	2	0.2
Messaging	No	1053	86.6	Studying	No	1210	99.5
	Yes	163	**13.4**		Yes	6	0.5
Social media	No	1181	97.1	Children care /Family care /Personal care	No	1145	94.2
	Yes	35	2.9		Yes	71	5.8
Gender	Male	548	54.9				
	Female	668	45.1				
ScGroup	Work-ing	86	7.1				
	Student	152	12.5				
	Uniden-tified	978	80.4				
TravelinGroup	Alone	805	66.2				
	In group	411	33.8				

N = 1216

The two Figures 5 and 6 below will help further illustrate the proportion of each multitasking type in relation with total studied passengers and total multitasking activities.

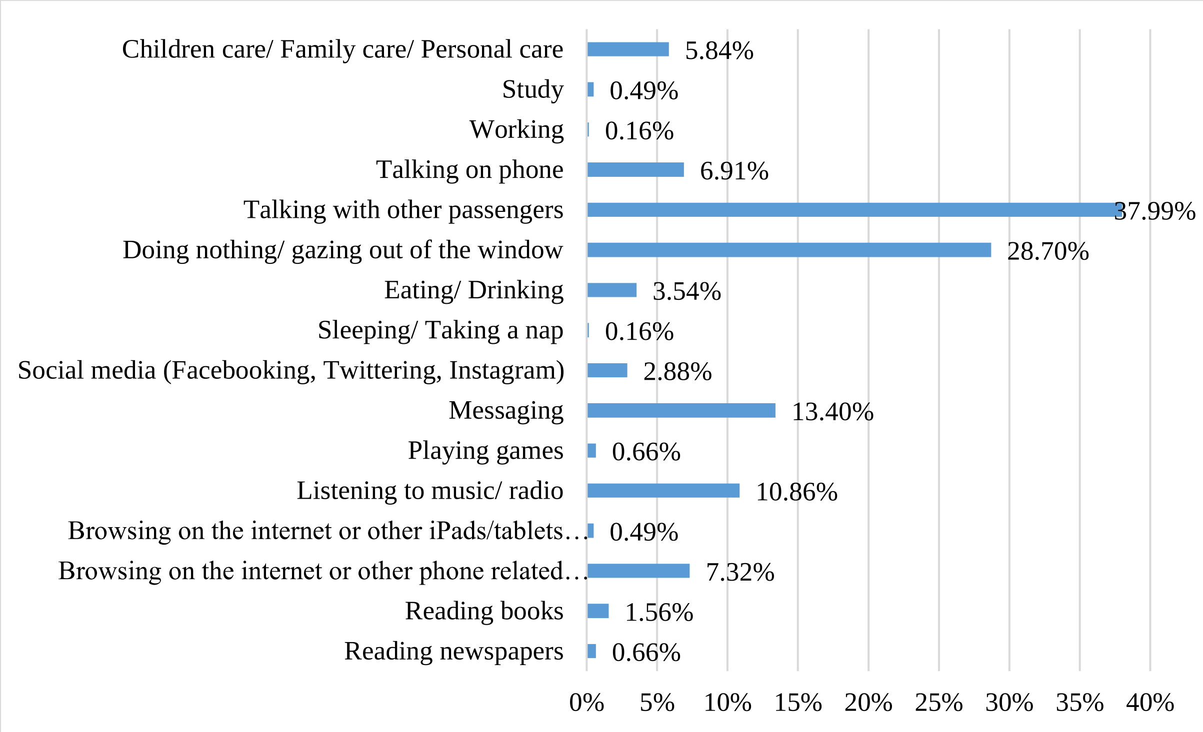


Figure 5. Proportion of multitasking activities per total observed objects (1216 objects)

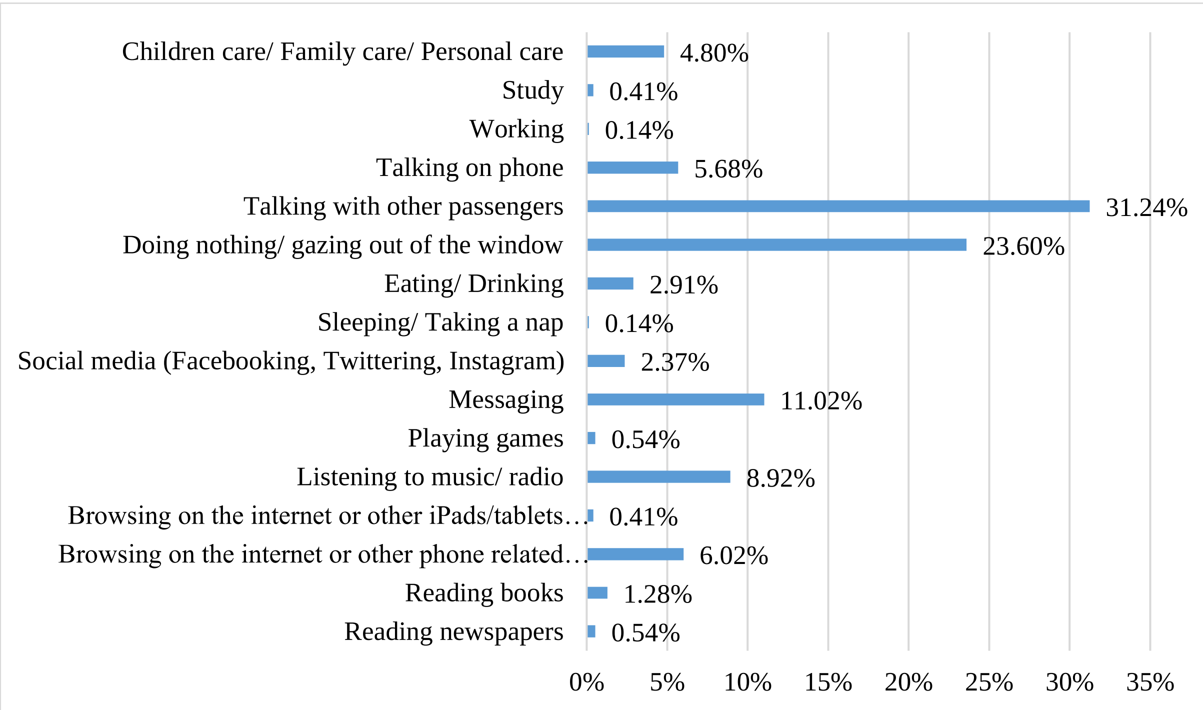


Figure 6. Proportion of multitasking per total multitasking activities (1479 activities)

Figure 5 reaffirms the interpretation of descriptive statistics with the same descending order. Again “talking with other passengers” takes lead with close approximation of 38%, followed by around 30% prefers either doing nothing or just gazing ahead or outside. Both categories already take up nearly two third of total activities observed in vehicle. While, the percentage of “messaging” and “listening to music or radio” are 13.4% and 10.86% respectively; other activities related to phone including mainly either browsing on phone or talking on phone, together accounts for approximately 15%. Around 6% activities on PT is associated with caring, in which three fourths are performed by females (52 out of 71 cases).

Figure 6 is with regard to the total amount of multitasking activities performed regardless whether several activities may derive from the same passenger. This comparison still ranks the same order with the combination of “talking with other passengers” and of “doing nothing and/or gazing out of the window” takes up just more than 50% total number of activities. 11.2% of total activities related to “messaging” and 8.92% belongs to “listening to music or radio”. Likewise, “working”, “sleeping and/or take a nap”, “browsing on iPads, tablets” and “studying” follow the same pattern of orders appearing to be least performed activities.

As mentioned in the previous part, to capture the proportion distribution of variables sharing the same characteristics, some multitasking activities are put under the same category which generates three more additional variables namely “Leisure”, “Conversa” and “WorkStu”. Figure 7 depicts the assigned proportion to each category. Among the multitasking activities, leisure overwhelms with 55.28%, followed by conversation with 38.88%. Only less than 1% is recorded concerning the number of passengers spending time working or studying during their travel.

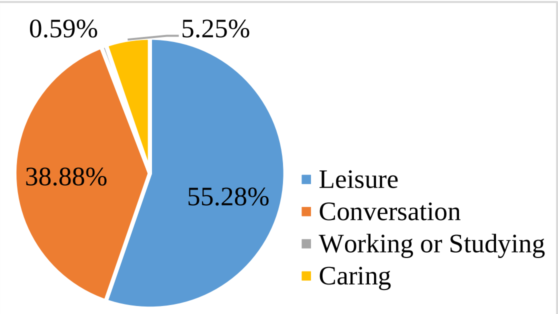


Figure 7. Proportion of multitasking activities within four main categories.

With regard to the correlation among the explanatory variables which is an important assumption of logistic regression, those coefficients should not be too high to avoid the multicollinearity problem. Table 5 shows the correlation matrix among the predictors, from which it is clear that the all the inter-correlation values are well below the threshold of 0.7 and the highest one is 0.696. Henceforth, multicollinearity seems not to be a matter in this paper.

Table 5. Pearson correlation among independent variables

	1	2	3	4	5	6	7
1. Type of transport	1						
2. Number of stops	.081**	1					
3. Crowdedness[a]	.266**	.026	1				
4. Crowdedness[b]	.135**	.044	.696**	1			
5. TravelinGroup	-.133**	.004	.004	.024	1		
6. Age range	-.085**	-.095**	.010	-.030	-.160**	1	
7. Gender	.046	.001	.021	.005	-.106**	.062*	1
8. ScGroup	-.206**	-.070*	.085**	.095**	.049	.173**	.060*

N = 1216
*p < .05 **p < .01
Crowdedness[a] : crowdedness of entire trip
Crowdedness[b] : crowdedness of individual journey

4.1.2. Logistic regression

As mentioned, “talking with other passengers”, “doing nothing and/or gazing out of the window”, “messaging” and “listening to music or radio” are most popular multitasks performed. Therefore, it is more interesting to explore which factors affect these activities. In other words, this part attempts to find out whether the way passengers multitask is contingent on several well-defined variables relating to their journeys and/or demographic characteristics. Four separate regressions are run in correspondence to four dependent multitasking variables. For all four regressions, passengers travel alone, younger than 20 years old, working group and females are used as reference categories. The results are shown from Table 6 to Table 9.

Table 6 reports only variable “TravelinGroup” has a positive significant impact on the activity “talking with other passengers”. Furthermore, the possibility that people travelling in group have conversation with other ones are higher than passengers who travel alone. Despite demographic factors do not have much influence on this type of activity; it is interesting to find out that passengers at the age range 20-30, 30-40, 50-60 and older than 60 are more likely to talk when travelling compared to ones under age of 20. The result also proves that males less often talk to others than females and working people more often have conversations with other passengers than the remaining two groups. Overall, the figures imply a good model fitness (p = 0.000) and it can explain 81% of the variance.

Table 6. The effect of independent variables on talking with other passengers

Variables	B	Sig.	Exp(B)
TranType	-.224	.180	.799
NumStops	-.008	.798	.992
OverCrow	.107	.781	1.112
IndiCrow	-.032	.891	.968
TravelinGroup(1)	6.230	**.000**	507.882
AgeRange		.330	
AgeRange(1)	.545	.340	1.725
AgeRange(2)	.102	.866	1.108
AgeRange(3)	-.276	.663	.759
AgeRange(4)	.088	.901	1.092
AgeRange(5)	.686	.346	1.985
Gender(1)	-.219	.387	.803
ScGroup		.327	
ScGroup(1)	-.119	.831	.888
ScGroup(2)	-.533	.224	.587
Constant	-1.828	.032	.161

N = 1216
R^2 Nagelkerke = 81%
χ^2 = 1099.84 df = 13 p=.000
TravelinGroup(1) = travel in group
AgeRange(1)= 20-30 AgeRange(2)= 30-40 AgeRange(3)= 40-50 AgeRange(4)= 50-60 AgeRange(5) > 60
Gender(1) = Male
ScGroup(1) = student ScGroup(2) = unidentified

Furthermore, when looking into the subgroup “travel in group”, it is expected that a passenger who travels with a companion already pre-determines the type of activity that he or she engages (higher probability of conversation) and the other factors (gender, age etc.) may be less important. An estimate in Figure 8 shows that within 411 passengers travelling in group, 97.6% of them engaged in conversation and 77% activities of this subgroup is conversation related in comparison with 517 activities performed in total. This summary reflects the assumption perfectly.

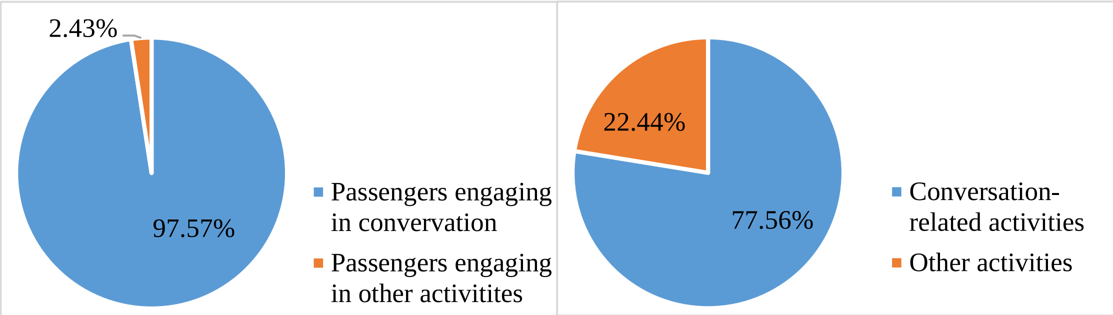


Figure 8. Distribution of conversation related activities within category "travel in group"

Table 7 exhibits that several variables have a significant impact on the passengers' state of "doing nothing/gazing out of the window", namely NumStops, TravelinGroup and AgeRange. Firstly, the more stops a passenger travels (or the longer the distance is), the more likely they would engage in an activity other than just "doing nothing" or "gazing out of the window". However, the attitude "doing nothing" in certain cases can be translated in a positive way because of their own motivation to do that, either by their liking or just simply due to their personality. Secondly, people travel in group have tendency not to engage in "doing nothing" than whom travel alone. Thirdly, age range also has some impacts. Within the middle to old age group, the older the passengers are, the more likely they will involve in "doing nothing". This tendency reassures findings from previous scholars (Kaufman-Scarborough & Lindquist, 1999). Overall, the figures imply a good model fitness (p = 0.000); however, it only explains a moderate percentage of the variance which is equivalent to 40.3%.

Table 7. The effect of independent variables on doing nothing/gazing outside

Variables	**B**	**Sig.**	**Exp(B)**
TranType	.141	.159	1.152
NumStops	-.077	**.000**	.926
OverCrow	.204	.368	1.227
IndiCrow	.111	.425	1.117
TravelinGroup(1)	-4.178	**.000**	.015
AgeRange		**.000**	
AgeRange(1)	-.626	.081	.535
AgeRange(2)	-.441	.232	.643
AgeRange(3)	.430	.251	**1.537**
AgeRange(4)	.750	.080	**2.117**
AgeRange(5)	1.294	**.006**	**3.648**

Gender(1)	-.091	.547	.913
ScGroup		.381	
ScGroup(1)	-.305	.429	.737
ScGroup(2)	.102	.704	1.108
Constant	-.625	.253	.535

N = 1216
R^2 Nagelkerke = 40.3%
χ^2 = 402.02 df = 13 p=.000
TravelinGroup(1) = travel in group
AgeRange(1) = 20-30 AgeRange(2) = 30-40 AgeRange(3) = 40-50 AgeRange(4) = 50-60
AgeRange(5) >60
Gender(1) = Male
ScGroup(1) = student ScGroup(2) = unidentified

Table 8 indicates the variables NumStops, TravelinGroup, AgeRange and ScGroup imposing significant influence on “messaging”. At first, it can be interpreted that the longer the distance, the higher probability that people will message. Moreover, people travel in group are less likely to message compared to whom travel alone. There seems also a significant linkage between social status and this type of activity. However, due to the uncertainty of group identification mentioned in the methodology section, it might be reasonable to leave it out for further study in the future. Finally, it also can be seen from the statistical result that women is more likely to message than man. Overall, the statistics imply a good model fitness (p = 0.000); yet it can only explain 10.7% of the variance.

Table 8. The effect of independent variables on messaging

Variables	B	Sig.	Exp(B)
TranType	.018	.875	1.019
NumStops	.068	**.000**	1.070
OverCrow	-.239	.394	.788
IndiCrow	.112	.528	1.118
TravelinGroup(1)	-.896	**.000**	.408
AgeRange		**.013**	
AgeRange(1)	.443	.237	1.557
AgeRange(2)	.286	.474	1.331
AgeRange(3)	-.049	.907	.952
AgeRange(4)	-.836	.155	.433
AgeRange(5)	-2.054	.057	.128
Gender(1)	.199	.263	1.220
ScGroup		**.010**	

ScGroup(1)	-.397	.284	.673
ScGroup(2)	-.797	**.005**	.451
Constant	-1.473	.012	.229

N = 1216
R^2 Nagelkerke = 10.7%
$\chi^2 = 72.76$ df = 13 p=.000
TravelinGroup(1) = travel in group
AgeRange(1) = 20-30 AgeRange(2) = 30-40 AgeRange(3) = 40-50 AgeRange(4) = 50-60
AgeRange(5) >60
Gender(1) = Male
ScGroup(1) = student ScGroup(2) = unidentified

Table 9 proposes that only TravelinGroup and AgeRange have a significant influential impact on "listening to music/radio". In details, passengers do not often listen to music/radio when they travel in group. It is understandable since they have to dedicate or share part of their time for conversation with accompanies. It is clearly defined from the table that the youngest group possesses the highest probability to listen to music/radio compared to the remaining age ranges. Next to that, it is seen that males are more likely to enjoy this activity than females. Such tendency can be concreted by the findings expressed in Table 10 (section 4.1.3) that men tend to engage in ICT use than women. Globally, the result hints the model is in good fitness (p = 0.000); also noting that it can only explain 27.3% of the variance.

Table 9. The effect of independent variables on listening to music/radio

Variables	B	Sig.	Exp(B)
TranType	-.203	.130	.816
NumStops	.041	.072	1.042
OverCrow	.011	.972	1.011
IndiCrow	.045	.823	1.046
TravelinGroup(1)	-2.545	**.000**	.078
AgeRange		**.000**	
AgeRange(1)	-.507	.133	.603
AgeRange(2)	-.966	**.009**	.381
AgeRange(3)	-3.476	**.000**	.031
AgeRange(4)	-3.579	**.001**	.028
AgeRange(5)	-20.324	.997	.000
Gender(1)	.359	.080	1.431
ScGroup		.107	
ScGroup(1)	.083	.845	1.087
ScGroup(2)	-.436	.225	.646

Constant	-.361	.567	.697

N = 1216
R^2 Nagelkerke = 27.3%
χ^2 = 177.25 df = 13 p=.000
TravelinGroup(1) = travel in group
AgeRange(1) = 20-30 AgeRange(2) = 30-40 AgeRange(3) = 40-50 AgeRange(4) = 50-60
AgeRange(5) >60
Gender(1) = Male
ScGroup(1) = student ScGroup(2) = unidentified

4.1.3. Influential effect of demographic factors on the frequency of using ICTs

In accordance with the results in section 4.1.2, demographic traits are among the noticeable factors influencing the decision of multitasking. Nevertheless, it is unknown that whether these factors have an impact on the attitude of passengers towards the use of ICTs or the way they interact with those devices. To uncover this question, an OLS regression is performed, in which the frequency of using ICTs plays as dependent variable and demographic characteristics, namely age range, gender and social group are in turn the independent variables. For this purpose, the social group is coded into 3 dummies which are Dworking (value equals to 1 if passengers belong to the working group, otherwise 0), Dstudent (value equals to 1 if passengers belong to the student group, otherwise 0) and Dunidentified (value equals to 1 if passengers belong to unidentified group, otherwise 0). Globally, the F test is statistically significant at p = 0.000 and the predictors all together explain 20.6% variance. The relations among variables are reported in Table 10.

Table 10. The effect of demographic factors on the frequency of using ICT

Variables	B	Sig.
Constant	.671	**.000**
Object's age range	-.094	**.000**
Object's gender	.142	**.001**
Dworking	.234	**.004**
Dstudent*	.063	.351

N = 1216
*Unidentified is the reference group

Statistically, all the demographic patterns taken into consideration under this analysis significantly influence the frequency that the passengers interact with their ICT devices (all have p values less than 0.05). Specifically, the passengers who are male, at the younger age range, working or studying more frequently use ICT compared to people who are female, at the older age range and have unidentified social group status respectively.

4.1.4. Moderation effect of crowdedness to the relationship of transport type and frequency of using ICTs

Also learnt from previous part (section 4.1.2), both crowdedness of the entire trip and individual journey do not directly place a significant influence on the two most popular types of multitasking activities using ICT devices which are messaging and listening to music or radio. Nevertheless, during the observation, the author acknowledges that crowdedness, to some extents, might affect the level the passengers using their ICT devices. For instance, it is seen that with uncrowded trips, people are more likely to multitask and that passengers have a tendency to more often use ICT devices when travelling by metro or tram compared to travelling by bus. It might be blamed for the differences in space or atmosphere in each transport type. Supporting this point, Table 11 which expresses a cross tabulation between the frequency of using ICT devices and type of transport reveals that passengers travelling by metro most often multitask continuously on ICT devices than tram and bus. Not contradict to that, figures indicate they mostly perform interruptedly in buses. Even though there is not significant differentiation in terms of percentages between the frequencies corresponding to each type of transport, this still raises a question about whether the type of transport influences the frequency that people interact with their ICT devices and whether this relationship becomes weaker or stronger with the presence of crowdedness factor.

Table 11. Frequency of using ICTs and type of transport crosstabulation

		Type of transport		
		Metro A Column N%	Tram B Column N%	Bus C Column N%
Frequency	No using	68.0% $_a$	68.8% $_a$	63.3% $_a$
	Interrupted	15.4% $_a$	19.7% $_{a,b}$	21.2% $_b$
	Continuously	16.6% $_a$	11.5% $_b$	15.5% $_{a,b}$

N=1216

Following model 1 proposed by Hayes (2013) which forecasts the moderation effect, Figure 9 depicts the relationship among these three variables.

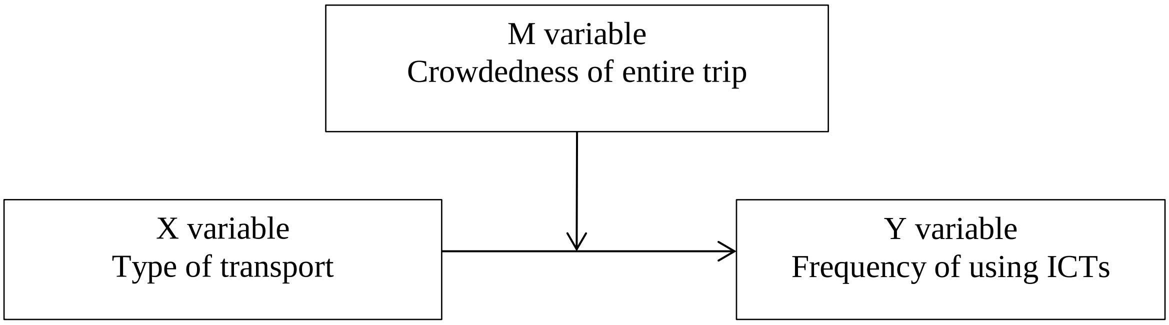


Figure 9. Moderating effect of crowdedness towards the relationship of transport type and frequency of using ICT devices

This conceptual model suggests that the influence of the X variable on the Y variable is dependent on the M variable. In other words, the effect on the dependent variable is the interaction of the independent and moderating variable. Table 12 demonstrates the regression result which clearly indicates a moderating effect of crowdedness on the relationship between transport type and frequency, taking into consideration that the interaction of crowdedness and transport type is significant at p = 0.0172. In short, it can be concluded that the transport type can influence the frequency that the passengers interact with their ICT devices; however the using level also depends on the crowdedness of the transport.

Table 12. Regression result on moderation effect of crowdedness

	Coeff.	SE	p
constant	.6291	.2402	.0089
OverCrow	.2241	.1403	.1104
TranType	.2358	.1022	.0212
int_1	-.1505	.0631	**.0172**
COVARIATES			
AgeRange	-.0933	.0166	.0000
Gender	.1453	.0416	.0005
ScGroup	-.0972	.0372	.0090

N = 1216
Notes:
OverCrow = crowdedness of the entire trip
TranType = transport type
int_1 = interaction between crowdedness of the entire trip and transport type

4.1.5. Will the modes of transport place the impact on passengers' behaviors?

One of the research questions in this study is that whether or not the mode of transport will have its influence to the passengers' behaviors. In other words, will the passengers in different modes of transport will tend to have different ways of performing multitasking activities? Table 13 clearly shows that whereas the people on trams and metros are most likely to have communication with others. In contrast, bus users are mostly likely to do nothing or gaze out of the window. Tram and metro passengers are also likely to engage in eating or drinking more than passengers on buses. This could be explained by the fact that travelling by tram and metro is likely more comfortable than by bus due to the better seats as well as requires less "manoeuvres" on the way. Interestingly, the table also reveals that more bus users involved in messaging activities than metro and tram users, taking up 14%. Those of trams and metros are just under 10% for each of them.

Table 13. Multitasking activities per mode of transport

S/N	**Activities**	**Bus**	**Tram**	**Metro**	**Regardless of mode**
1	Reading newspapers	0.88%	0.19%	0.61%	0.54%
2	Reading books	0.88%	**1.13%**	**1.84%**	1.28%
3	Browsing on the internet or other phone related activities	6.13%	6.58%	5.31%	6.02%
4	Browsing on the internet or other iPads/tablets related activities	0.00%	0.19%	1.02%	0.41%
5	Listening to music/ radio	**11.60%**	6.58%	8.98%	8.92%
6	Playing games	0.44%	0.38%	0.82%	0.54%
7	Messaging	**14.00%**	**9.77%**	**9.59%**	11.02%
8	Social media (Facebooking, Twittering, Instagram)	2.84%	2.44%	1.84%	2.37%
9	Sleeping/ Taking a nap	0.00%	0.00%	0.41%	0.14%
10	Eating/ Drinking	1.75%	**3.01%**	**3.88%**	2.91%
11	Doing nothing/ gazing out of the window	**27.79%**	21.99%	21.43%	23.60%
12	Talking with other passengers	23.63%	**33.83%**	**35.51%**	31.24%
13	Talking on phone	5.69%	6.58%	4.69%	5.68%
14	Working	0.00%	0.19%	0.20%	0.14%
15	Study	0.88%	0.19%	0.20%	0.41%

16	Children care/ Family care/ Personal care	3.50%	**6.95%**	3.67%	4.80%

N= 1459
457 activities on bus, 532 on tram, 490 on metro

Regardless of mode, the proportion of multitasks performed by using ICTs takes up approximately 35% on average. Figure 10 reveals that while tram and metro share the same percentage of just above 32%, that of bus is slightly higher (40%).

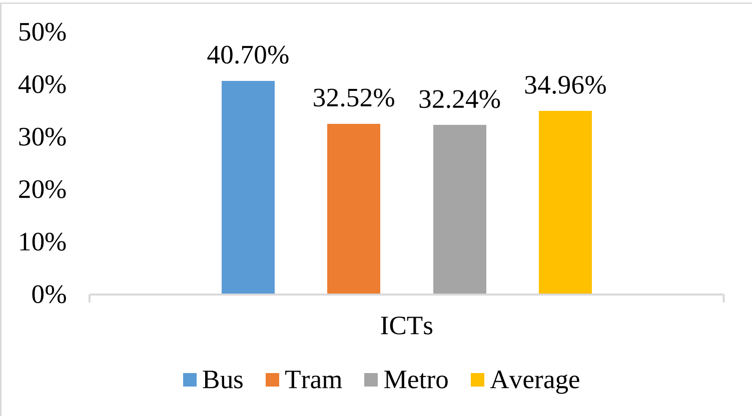


Figure 10. Multitasking activities performed by ICTs

4.1.6. Will the behaviors on different modes of transport be affected by gender?

Table 14 reveals the distinguishing allocation of multitasking activities regarding sex in three studied modes of transport. Women tend to have verbal face-to-face conversation more than men regardless of transport mode, in which the proportion of women (about 22%) are twice as likely to talk with other passengers around as that of men (around 12%). This tendency might be explained by the natural difference of social psychology between the two genders. In other words, things might be interesting to males do not equally mean the same to females and vice versa. “Doing nothing and/or gazing out of the window” and “messaging” follow the same pattern in which more men involve in multitasks than women.

Table 14. Multitasking activities performed by gender per mode of transport

S/N	Activities	Bus		Tram		Metro	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**
1	Reading newspapers	0.88%	0.00%	0.19%	0.00%	0.20%	0.41%
2	Reading books	0.66%	0.22%	0.75%	0.38%	0.82%	1.02%

3	Browsing on the internet or other phone related activities	3.94%	2.19%	3.57%	3.01%	1.84%	3.47%
4	Browsing on the internet or other iPads/tablets related activities	0.00%	0.00%	0.19%	0.00%	0.61%	0.41%
5	Listening to music/ radio	6.56%	5.03%	3.57%	3.01%	4.08%	4.90%
6	Playing games	0.00%	0.44%	0.38%	0.00%	0.61%	0.20%
7	Messaging	6.56%	**7.44%**	**5.08%**	4.70%	4.49%	**5.10%**
8	Social media (Facebooking, Twittering, Instagram)	0.88%	**1.97%**	1.13%	**1.32%**	0.82%	**1.02%**
9	Sleeping/ Taking a nap	0.00%	0.00%	0.00%	0.00%	0.00%	0.41%
10	Eating/ Drinking	0.66%	1.09%	1.69%	1.32%	1.22%	2.65%
11	Doing nothing/ gazing out of the window	13.13%	**14.66%**	**11.09%**	10.90%	10.20%	**11.22%**
12	Talking with other passengers	10.07%	**13.57%**	12.22%	**21.62%**	13.27%	**22.24%**
13	Talking on phone	**3.28%**	2.41%	2.82%	**3.76%**	1.22%	**3.47%**
14	Working	0.00%	0.00%	0.19%	0.00%	0.20%	0.00%
15	Study	0.22%	0.66%	0.00%	0.19%	0.20%	0.00%
16	Children care/ Family care/ Personal care	0.88%	**2.63%**	2.07%	**4.89%**	0.82%	**2.86%**

N= 1459
457 activities on bus, 532 on tram, 490 on metro

Figure 11 also shows that 18.01% of the passengers have two or more multitasking activities and around half of them (63 passengers) combined listening to music with other activities at the same time. It turns out that the activity of “listening to music or radio” has minimal to no impact to other multitasks (e.g. messaging, social media, etc.)

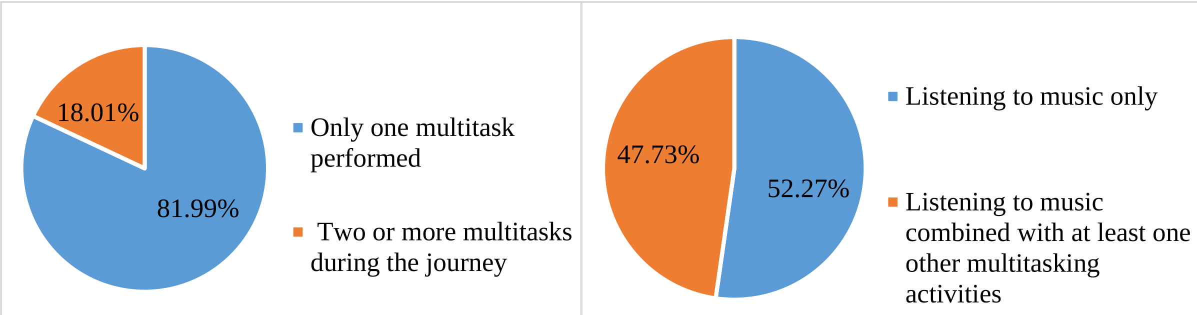


Figure 11. Proportion of passengers with two or more multitasks and those combine "listening to music or radio" with other activities (1216 passengers in total)

When looking into the distribution by gender, Table 15 illustrates that women are likely to perform two or more multitasks during the journey than men, in which the distributions of combining "listening to music or radio" and at least one other activities in bus and tram share the same proportion between both sexes. However, females tend to perform such combined activity in metro more than males do.

Table 15. Special cases of multitasking activities and distributions by gender

S/N	Activities	Bus		Tram		Metro	
		Male	**Female**	**Male**	**Female**	**Male**	**Female**
1	Two or more multitasks during the journey	6.13%	**7.0%**	7.33%	**8.65%**	5.51%	**9.59%**
2	Listening to music/ radio and at least one other activity	2.63%	2.63%	1.5%	1.5%	1.84%	2.86%

N= 1459
219 cases that two or more multitasks at the same time or consequentially, in which 60 on bus, 85 on tram, 74 on metro
63 cases combining listening to music/radio and at least one other activities (24 on bus, 16 on tram, 23 on metro)

4.2. Robustness

With the aim to re-affirm the conclusion drawn in the previous sections regarding the influential factors on most popular types of multitasking activities, another analysis technique is performed. To avoid the possible heteroscedasticity matter relating to the dependent variables with which the ordinary least squares regression (OLS) might have flaw to deal, the

White tests are run to compare with the achieved results. The outcomes are again consistent as showing that for "talking with other passengers", only "travel in group" plays as the influential factor ($p = 0.000$). Whereas "doing nothing and/or gazing out of the window" depends on the distance (number of stops), "travel in group" and "age range" (all three variables have $p = 0.000$). Similarly, for the multitasking category "messaging", those factors namely "number of stops" ($p = 0.0022$), "travel in group" ($p = 0.000$), "age range" ($p = 0.0001$) and "social group" ($p = 0.0084$) indeed have significant impacts. Next to that, results reveal that both variables "travel in group" and "age range" significantly influence the activity "listening to music/radio" (both have $p = 0.000$).

Likewise, with regard to the effect of demographic factors on the passengers' level of interaction with their ICTs, the White test generates and confirms the same result which means that "age range" ($p = 0.000$), "gender" ($p = 0.0008$), and "social group" ("working group" in particular) ($p = 0.0065$) have an influential impact on the frequency of using ICTs.

Obviously, it can be now concluded that there are no differences in generated outcomes between the adopted techniques and the conclusions drawn in previous parts of this paper are firmly held.

Detailed robustness test results can be referred to the appendixes.

Chapter 5
Discussion and Recommendation

5.1. Discussion

Back to the raised questions within the realm of interest of this research, there are some crucial conclusions which can be drawn from the analysis result. To the context of the observation, together with "doing nothing and/or gazing out of window", the other three most popular observed multitasking activities are "talking with other passengers", "messaging" and "listening to music/radio". Regardless of mode, all of them combined together take up three fourths the total number of multitasking activities in vehicles.

The analysis shows that the length of the journey has significant influence to the way people behave when riding on public transport. The longer the distance is (or the more stops a passenger travels), the more likely he or she would engage to an activity other than just "doing nothing". However, "doing nothing" does not need to be understood negatively. As discussed in the chapter two, people who spend time to do nothing may have their own motivation to do that, either by enjoying such moment or just simply because of their personality. Age also has some impact. Within the middle to old age group, the older people are, the more likely they will engage in "doing nothing". This is corresponding to the finding of Kaufman-Scarborough and Lindquist (1999) that older people tend to less participate in activities than the younger. Moreover, it is learned that the younger group tends to be more active with ICT devices, whereas older ones prefer talking with their companions or simply not engaging in any activities. This point might be associated with the characteristics of the Y generation who are believed to be born in the technology millennium and hence more addicted to technology and digital advances such as the internet, social media, etc.

Another finding is that when travelling in group, the probability that people have conversation with others are higher than those who travel alone. This finding is actually understandable due to the fact that those travelling in group normally know each other in advance which is boundaryless for communication and may also make the trip more interesting. This finding can be linked to the recent research in Belgium conducted by Keseru et al. (2015). In such study, they find that 50.9% multitasking trips were accompanied with the presence of travel companions. For those who travel alone, on the other hand, it is not always easy to break the ice with people that they do not know about. Travelling alone or in group affects the category "listening to music or radio" as well. Passengers travelling in group tend to perform less, compared to those who travel without partners.

Gender, also, places its impact on the multitasking activities. Keseru et al. (2015) reports that women are more likely to participate in conversation than men. This tendency is re-affirmed again in our report in which men less engage on "talking with other passengers" than women. At the first sight, it seems correct because it reflects the acceptably widespread stereotype with little question that women tend to talk more than men. However, several researches prove the opposite. Hence, the curious question here is how to interpret the above result correctly? It depends on the "context and structure of social interaction", James and Drakich (1993, p. 281) argue. According to their study, men and women generally have their own goals in socialization, males frequently tend to talk in the formal setting requiring more formal interaction (p. 299), whereas the situation that females are found to talk more often takes place in the informal context where they tend to keep the conversation more smoothly and "show goodwill towards others" (p. 302). "Women are also expected to talk more about personal feelings and other socio-emotional matters relevant to interpersonal relationships to a greater extent than do men" (p. 302). The above perception might be considered help explain the common findings in both this thesis and previous study conducted by Keseru et al. (2015), where the public transport environment will absolutely be the social setting, not simply a formal stage where men can show their interest. However, in return, it is found that males are likely to message than females.

Not only having the influence on "doing nothing and/or gazing out of the window", distance, as an independent variable, also affect the probability that PT users send or receive messages. The longer the distance (or the more the number of stops), the higher the probability.

Frequency of using ICTs, on the one hand, is significantly influenced by demographic patterns. Male passengers and who are at the young age are more frequently use ICTs than female and elderly ones respectively. On the other hand, the frequency in the relationship with type of transport is moderated by the in-vehicle crowdedness level. On average, around 35% total activities are ICTs related. However, it is more on buses (just over 40%) than trams and metros (around 32%). We can conclude that ICTs have a significant involvement among PT passengers' multitasking activities. This finding challenges the opposite claim from Vilhelmson et al. (2011) that "mobile ICT use is still rather low in terms of frequency of use by all travelers, it should still be regarded as offering considerable potential for growth" (p. 153). In addition, the observation and its regression results also suggest that the mode of transport does not significantly affect the choice of multitasks, nevertheless it indeed influences the way passengers interact with their ICT devices. For instance, people travel by metro are more frequently using ICT devices than by tram or bus.

Another noticeable finding is that there is always a certain percentage of people who performed more than one multitask task while on the move. This corresponds to the previous literature from scholars (Circella et al., 2012; Ironmonger, 2003; Vilhelmson et al., 2011).

In accordance with some additional notes when carrying out the observation, it is recognizable that nowadays people have the propensity to bring along ICT devices regardless whether or not they have the real need to interact with these devices during travelling. Only a small percentage of studied passengers perform multitasks on tablet and laptop. It is a positive point that in the technology era nowadays, people still prefer having person-to-person conversations. To what observed, whenever they travel in pair or in group, there is very little chance that these passengers perform other activities rather than talking with each other. Some of them sometimes combine this activity with other multitasks, yet not very considerable.

5.2. Comparison with previous study in Brussels

The second part of this chapter is to perform the cross-check and discuss the similarities as well differentiations between the findings in this thesis with the existing study conducted by Patriarche and Huynen (2014) on how people in Brussels allocate their use of travel time, based on the survey on the Belgians' mobility program (BELDAM). The major figures for public transport itself including bus, tram and metro are reported in Table 16.

Table 16. Mobile activities in Brussels public transport (Patriarche & Huynen, 2014)

S/N	**Activities**	**Bus**	**Tram/Metro**	**Regardless of mode**
1	Radio/Music (radio/muziek)	**41.3%**	**39.8%**	40.3%
2	Talking (Praten)	41.0%	38.7%	39.5%
3	Phone call (telefoneren)	35.0%	34.1%	34.4%
4	SMS (sms'en)	48.9%	42.9%	44.9%
5	Take a rest (dromen, rusten)	41.1%	38.3%	39.2%
6	Reading (lezen)	39.3%	46.0%	43.8%
7	Play (spelen)	4.5%	7.5%	6.5%

8	Work (werken)	8.3%	13.0%	11.4%
9	Watching movies (kijken naar films)	0.0%	1.1%	0.7%
10	Others (andere)	3.7%	1.8%	2.4%
11	Doing nothing (geen activiteit)	8.6%	10.7%	10.0%

N= 2438
in total including walking, bus, tram/metro, train, driving (driver), driving (passenger)
In which: 416 by bus, 878 by tram and metro together
Average = (bus + tram/metro * 2)/3

There are a number of similarities in the two researches. First of all, both researches investigate nearly equal sample sizes, with 1294 passengers in BELDAM (Patriarche & Huynen, 2014) and 1216 in this study, which provides a perfect condition and make a perfect sense to compare them together. Despite the fact that the two researches use different methodologies, one is based on the Belgian national survey data, while another one is based on the in-field observation; it is impressive that they seem lead to the very similar findings in general. The first similar conclusion is that "talking" and "listening to music or radio" remain two of the most activity-occupied categories. However, while the category "listening to music or radio" have the same tendency, category "talking" is recorded oppositely. The result shows that the proportion of passengers listening to music/ radio while riding on buses is slightly higher than on trams and metros, with 11.6% (bus) compared to 6.58% (tram) and 8.98% (metro) in this research; whereas those of Patriarche and Huynen (2014) are 41.3% (bus) and 39.8% (tram/metro) respectively. Category "talking" will be discussed later on this chapter. The second similarity is that bus users tend to text (SMS) more than those travelling by tram or metro, with 14% (bus) compared to just under 10% (tram/ metro) on this research; those of Patriarche and Huynen (2014) are 48.9% for bus in comparison with 42.9% for tram/ metro. The same tendency can be found that category "work".

In contrary, there are still differentiations between the two findings. Firstly, as mentioned above, while the author's analysis concludes that people on buses are less likely to engage themselves in the verbal conversation with others, Patriarche and Huynen (2014) reports that the percentage is about the same in both transport modes, with slightly higher on bus (41%) than metro or tram (38.7%). Secondly, in this study, it is reported that "doing nothing and/or gazing out of the window" accounted for the second biggest proportion, while such category remains in the minority groups in Patriarche and Huynen 's findings when looking at BELDAM survey data. Moreover, one statement does not completely make a good sense is that they claim passengers on tram/ metro are more likely to engage on the activities other than "doing nothing" compared with those riding on buses. Whereas, due to the less comfort and more "manoeuvres" on the way, it is expected people on bus are more likely to "do nothing". The third significant difference between two researches is while the number of activities "taking a rest" observed in the field work is very minimal (less than 1%), it was reported with 41.1% on bus and 38.3% on tram/ metro by BELDAM (Patriarche & Huynen, 2014). The possible explanation for such a big gap between the two may come from one of the common issues in social research identified by Bryman (2015) that "people may vary in their interpretations of key terms in a question" (p. 271). For instance, "doing nothing" could mean "taking a rest" by some people, whereas some others may categorize "doing nothing" as its literal meaning.

Also, surprisingly that the previous study (Patriarche & Huynen, 2014) reveals that there is a large proportion of people occupied by activity "reading" (39.3% and 46% for bus and tram/metro respectively), whereas the recent field work in this thesis shows the opposite, which contests against the existing survey. The suitable explanation could be due to the lack of space and unsuitable environment because of overcrowdedness, too much movements when other passengers get on and off, etc. Nevertheless, there is still one thing in common that women are more likely to dedicate themselves on phone communication in tram and metro, while men are more likely to talk on phone while riding on bus.

The two similarity and differentiation components raise several interesting and curious questions to (1) develop the tailored theoretical framework and (2) select the best customized options of data collection methodology for further studies. While the former component, similarities, positively enhances the reliability and confirm the validity of some categories; the latter, differentiations between the others, should even be dug deeper so as to find the actual rationales hidden behind. The aim of further studies is perhaps not to agree with one conclusion and reject the other, but more about how to understand and reasonably explain both of them depending on their own unique characteristics or context. The answer can only be found with the sufficiently number of studies and experiments. In any cases, the comprehensive understanding of such phenomenon is a real need and maybe conducting the research in a larger scale can reveal the hidden corners of the enter picture of Brussels public transport and its users.

5.3. Recommendation

This study has some practical implications. With these things taken into consideration, it is clearly illustrated that some factors are crucial to the way people multitask on the go when using public transport. Among these, demographic, distance and crowdedness aspects should be paid sufficient attention as they turn out to significantly influence the propensity of performing a certain multitask. Transport policy maker may refer to the results from this research's findings to implement better strategies for transport appraisal to not only just improve the nature of transport infrastructure and services, but improve also its Clients' satisfactions in order to compete with personal (cars) vehicle and lean towards the more "relaxable" modes. ICT integration in the vehicle can also be worth studying. On the one hand, it is to fulfill the needs of social participation of transport users. On the other hand, it may bring more knowledge to the society. A good example is that, tram lines in Warsaw, Poland, are equipped with the real time indicator of stops on the side of the tram, whereas those screens at the walkway are used to educate people about the English language by running the random sentences in their own language with the instant translation of English right below as subtitles.

Even though this research bases on the dataset with studied objects travelling only by public transport, the conclusion is a good reference to travel agencies for how to improve their services, reinforce customers' satisfaction and retention. By tracking the historical database which gives detail information on demographic traits of customers they are serving, those agencies could further provide proper solutions to their targeted customer group.

Although several findings are concluded, this research still has a few limitations. Firstly, since the observation session is conducted in a limited amount of time and did not cover all the geographical contexts, it has some limitations to generalize to the entire population. A longer data collection period and a wider breadth of choice in terms of transport lines per mode might contribute to and re-affirm the findings represented in this paper. Secondly, the study did not prioritize the order of activities, while in reality that some activities will be more important to a passenger compared to others. Nevertheless, it is truly difficult to prioritize them without the knowledge of personal motivations behind. Therefore, this issue raises an opportunity for further development. Considering the combination of observational study to learn about the manifest behaviors, and followed by the mail-back questionnaire survey to understand the feeling, motivations, reasoning behind the scene, could be one of the best methodology to study. Thirdly, the data collected in support of this thesis do not cover all the hours of the day, especially the peak hours due to the difficulty of “overcrowdedness” and “overmovement” of the observed objects. If a future researcher can find the solution to tackle this problem, he or she can shed the light on unrevealed manners. Finally, even though it is not within the scope of this thesis; it may, however, be interesting for scholars to explore whether the outside sceneries have the noticeable impacts on the activities passengers might engage when performing the comparison study between metro lines, which mostly operates underground, and tram lines, which mostly operate on the normal roads with an opportunity to enjoy the beauty of the surroundings.

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Appendix

Table 13.3.1.1

Public transport ridership by each mode of transport by STIB in Brussels-Capital Region 2000-2014

	2000	2001	2002[b]	2003	2004	2005	2006	2007	2008	2009	2010	2011[b]	2012	2013	2014
Métro	78.2	83.7	96.6	102.5	105.5	114.5	122.0	128.3	135.5	133.4	150.8	125.8	132.4	138.3	133.4
Tram	47.5	51.8	57.6	63.5	66.4	68.8	70.4	73.2	73.8	76.3	81.2	112.1	123.4	128.9	131.3
Bus	44.4	47.1	50.1	54.4	66.0	70.3	75.8	74.6	75.5	79.7	78.4	90.8	92.1	87.1	99.3
Bus (transports spéciaux)	:	:	:	:	1.3	1.2	1.2	1.2	1.3	1.2	1.2	1.2	1.0	0.5	0.6
Total	**170.1**	**182.6**	**204.3**	**220.4**	**239.2**	**254.8**	**269.4**	**277.3**	**286.1**	**290.6**	**311.6**	**329.9**	**348.8**	**354.8**	**364.6**

Unit : million trips
Geographical scale: region
Source : IBSA and STIB
Link: http://statistics.brussels/themes/mobility-and-transport#.V0yKz_l97IU
Filename: Collective transport and shared mobility (.xls) (FR) - 03/2016
Table 13.3.1.1

: = Not available
b = break in time series

OBSERVATION FORM

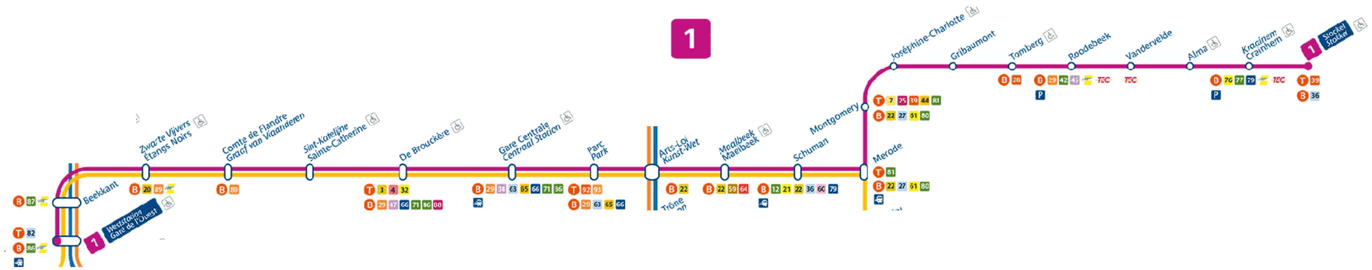
Date:	
Time:	

Line number:	1

From:	Gare de l'Ouest
To:	Stockel

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)



S/N	Demographic						Distance & crowdedness																					No. of stops	
	Range of age	Gender		Group			Gare de l'Ouest	Beekkant	Étangs Noirs	Comte de Flandre	Sainte-Catherine	De Brouckère	Gare Centrale	Parc	Arts-Loi	Mael-beek	Schu-man	Me-rode	Mont-gomery	Joséphine Charlotte	Gribau-mont	Tom-berg	Roode-beek	Vander-belde	Alma	Crain-hem	Stockel	(to observe distance impact)	
		Male	Female	Working people	Student	Unidenti-fied																							
Object 1																													1
Object 2																													2
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Object 12																													12
Object 13																													13
Object 14																													14
Object 15																													15

S/N	Passenger activity category																		
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking							
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone				Partly use	Continu-ously use	
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
Object 5																			5
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Object 11																			11
Object 12																			12
Object 13																			13
Object 14																			14
Object 15																			15

OBSERVATION FORM

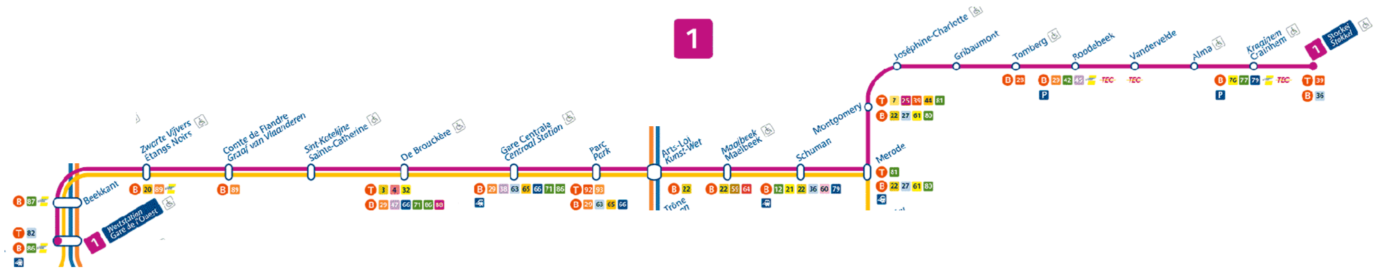
Date:	
Time:	

Line number:	1

From:	Stockel
To:	Gare de l'Ouest

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)



S/N	Demographic						Distance & crowdedness																				No. of stops	
	Range of age	Gender		Group			Stockel	Crain-hem	Alma	Vander-belde	Roode-beek	Tom-berg	Gribau-mont	Joséphine Charlotte	Mont-gomery	Me-rode	Schu-man	Mael-beek	Arts-Loi	Parc	Gare Centrale	De Brouckère	Sainte-Catherine	Comte de Flandre	Étangs Noirs	Beekkant	Gare de l'Ouest	(to observe distance impact)	
		Male	Female	Working people	Student	Unidenti-fied																							
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Object 11																													11
Object 12																													12
Object 13																													13
Object 14																													14
Object 15																													15

S/N	Passenger activity category																		
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking					Partly use	Continu-ously use	
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone						
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
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Object 10																			10
Object 11																			11
Object 12																			12
Object 13																			13
Object 14																			14
Object 15																			15

OBSERVATION FORM

Date:	
Time:	

Line number:	6	From:	Elisabeth
		To:	Roi Baudouin

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	Demographic						Distance & crowdedness																										No. of stops	
	Range of age	Gender		Group			Elisa-beth	Ribau-court	Yser	Rogier	Bota-nique	Ma-dou	Arts-Loi	Trône	Porte de Namur	Louisa	Hôtel des Mon-naies	Porte de Hal	Gare du Midi	Clemen-ceau	Delac-roix	Gare de L' Ouest	Beek-kant	Osse-ghem	Simonis	Bel-gica	Pannen-huis	Bock-stael	Stuyven-bergh	Houba-Brug-mann	Hey-sel	Roi Bau-douin	(to observe distance impact)	
		Male	Female	Working people	Student	Unidenti-fied																												
Object 1																																		1
Object 2																																		2
Object 3																																		3
Object 4																																		4
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Object 14																																		14
Object 15																																		15

S/N	Passenger activity category																		
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking							
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone				Inter-rupted use	Continu-ously use	
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
Object 5																			5
Object 6																			6
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Object 10																			10
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Object 13																			13
Object 14																			14
Object 15																			15

OBSERVATION FORM

Date:	
Time:	

Line number:	6

From:	Roi Baudouin
To:	Elisabeth

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	Demographic						Distance & crowdedness																										No. of stops	
	Range of age	Gender		Group			Roi Baudouin	Heysel	Houba-Brugmann	Stuyvenbergh	Bockstael	Pannenhuis	Belgica	Simonis	Osseghem	Beekkant	Gare de L' Ouest	Delacroix	Clemenceau	Gare du Midi	Porte de Hal	Hôtel des Monnaies	Louisa	Porte de Namur	Trône	Arts-Loi	Madou	Botanique	Rogier	Yser	Ribaucourt	Elisabeth	(to observe distance impact)	
		Male	Female	Working people	Student	Unidentified																												
Object 1																																		1
Object 2																																		2
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Object 13																																		13
Object 14																																		14
Object 15																																		15

S/N	Passenger activity category																	
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking					Inter-rupted use	Continu-ously use	
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone						
Object 1																			1
Object 2																			2
Object 3																			3
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Object 14																			14
Object 15																			15

OBSERVATION FORM

Date:	
Time:	

Line number:	4

From:	Gare du Nord
To:	Stalle

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	Demographic						Distance & crowdedness																					No. of stops	
	Range of age	Gender		Group			Gare du Nord	Rogier	De Brouckère	Bourse	Anness-ens	Lemon-nier	Gare du Midi	Porte de Hal	Parvis de Saint Gilles	Horta	Albert	Berken-dael	Vander-kindere	Messi-dor	Boeten-dael	Héros	Glob e	Wagon	Egide	Carre-four Stalle	Stalle	(to observe distance impact)	
		Male	Female	Working people	Student	Unidenti-fied																							
Object 1																													1
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Object 13																													13
Object 14																													14
Object 15																													15

S/N	Passenger activity category																	
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency	
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking					Partly use	Continu-ously use
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone					
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
Object 5																			5
Object 6																			6
Object 7																			7
Object 8																			8
Object 9																			9
Object 10																			10
Object 11																			11
Object 12																			12
Object 13																			13
Object 14																			14
Object 15																			15

OBSERVATION FORM

Date:	
Time:	

Line number:	4

From:	Stalle
To:	Gare du Nord

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	Demographic						Distance & crowdedness																					No. of stops	
	Range of age	Gender		Group																									
		Male	Female	Working people	Student	Unidentified	Stalle	Carrefour Stalle	Egide	Wagon	Globe	Héros	Boetendael	Messidor	Vanderkindere	Berkendael	Albert	Horta	Parvis de Saint Gilles	Porte de Hal	Gare du Midi	Lemonnier	Anneessens	Bourse	De Brouckère	Rogier	Gare du Nord	(to observe distance impact)	
Object 1																													1
Object 2																													2
Object 3																													3
Object 4																													4
Object 5																													5
Object 6																													6
Object 7																													7
Object 8																													8
Object 9																													9
Object 10																													10
Object 11																													11
Object 12																													12
Object 13																													13
Object 14																													14
Object 15																													15

S/N	Passenger activity category																		
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listening to music/ radio	Playing games	Messaging	Social media (Facebook-ing, twitter-ing, instagram)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking							
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone				Partly use	Continuously use	
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
Object 5																			5
Object 6																			6
Object 7																			7
Object 8																			8
Object 9																			9
Object 10																			10
Object 11																			11
Object 12																			12
Object 13																			13
Object 14																			14
Object 15																			15

OBSERVATION FORM

Date:	
Time:	

Line number:	71

From:	De Brouckère
To:	Delta

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	Demographic						Distance & crowdedness																					No. of stops	
	Range of age	Gender		Group			De Brouckère	Arenberg	Gare Centrale	Bozar	Royale	Troon	Porte de Namur	Matongé	Quartier St-Boniface	Fernand Cocq	Musée d'Ixelles	Flagey	Étangs d' Ixelles	Géo Bernier	Buyl	Jeanne	ULB	Cimet-ière d'Ixelles	Fraiteur	Triom-phe	Delta	(to observe distance impact)	
		Male	Female	Working people	Student	Unidenti-fied																							
Object 1																													1
Object 2																													2
Object 3																													3
Object 4																													4
Object 5																													5
Object 6																													6
Object 7																													7
Object 8																													8
Object 9																													9
Object 10																													10
Object 11																													11
Object 12																													12
Object 13																													13
Object 14																													14
Object 15																													15

S/N	Passenger activity category																		
	Leisure											Normal conversation		Working	Studying	Children care/ Family care/ Personal care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking							
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone				Partly use	Continu-ously use	
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
Object 5																			5
Object 6																			6
Object 7																			7
Object 8																			8
Object 9																			9
Object 10																			10
Object 11																			11
Object 12																			12
Object 13																			13
Object 14																			14
Object 15																			15

OBSERVATION FORM

Date:	
Time:	

Line number:	71

From:	Delta
To:	De Brouckère

Overall Crowdedness	

1 = uncrowded (more seats than people)
2 = normal (enough seats for people)
3 = crowded (not enough seats for people)

S/N	Demographic						Distance & crowdedness																						No. of stops	
	Range of age	Gender		Group			Delta	Beaulieu	Delta	Fraiteur	Cimetière d'Ixelles	ULB	Jeanne	Buyl	Géo Bernier	Étangs d'Ixelles	Flagey	Musée d'Ixelles	Fernand Cocq	Quartier St-Boniface	Maton-ge	Porte de Namur	Troon	Royale	Bozar	Gare Centrale	Arenberg	De Brouckere	(to observe distance impact)	
		Male	Female	Working people	Student	Unidenti-fied																								
Object 1																														1
Object 2																														2
Object 3																														3
Object 4																														4
Object 5																														5
Object 6																														6
Object 7																														7
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Object 10																														10
Object 11																														11
Object 12																														12
Object 13																														13
Object 14																														14
Object 15																														15

S/N	Passenger activity category																		
	Leisure											Normal conversation		Working	Studying	Children care/ Family care	Frequency		
	Reading		Browsing on the internet or other e-devices related activities		Listen-ing to music/ radio	Playing games	Messag-ing	Social media (Facebook-ing, twitter-ing)	Sleeping/ taking a nap	Eating/ Drinking	Doing nothing/ gazing out of the window	Talking							
	Newspaper	Books	on phones	on Ipads, tablets								with other passengers in vehicle	on phone				Partly use	Continu-ously use	
Object 1																			1
Object 2																			2
Object 3																			3
Object 4																			4
Object 5																			5
Object 6																			6
Object 7																			7
Object 8																			8
Object 9																			9
Object 10																			10
Object 11																			11
Object 12																			12
Object 13																			13
Object 14																			14
Object 15																			15

Descriptive Statistics

	N	Mean	Std. Deviation
Crowdedness of the entire trip	1216	1.6714	.46653
Crowdedness of the studied object's journey	1216	1.8222	.74149
Number of stops the passenger travels	1216	5.7656	4.13817
Object's age range	1216	3.0008	1.26459
Frequency of using ICT	1216	.4770	.73443
Valid N (listwise)	1216		

Correlations

		Type of transport	Number of stops the passenger travels	Crowdedness of the entire trip	Crowdedness of the studied object's journey	Whether the passenger travels alone or in group	Object's age range	Object's gender	Object's group
Type of transport	Pearson Correlation	1	.081**	.266**	.135**	-.133**	-.085**	.046	-.206**
	Sig. (2-tailed)		.005	.000	.000	.000	.003	.112	.000
	N	1216	1216	1216	1216	1216	1216	1216	1216
Number of stops the passenger travels	Pearson Correlation	.081**	1	.026	.044	.004	-.095**	.001	-.070*
	Sig. (2-tailed)	.005		.361	.125	.880	.001	.962	.015
	N	1216	1216	1216	1216	1216	1216	1216	1216
Crowdedness of the entire trip	Pearson Correlation	.266**	.026	1	.696**	.004	.010	.021	.085**
	Sig. (2-tailed)	.000	.361		.000	.884	.738	.463	.003
	N	1216	1216	1216	1216	1216	1216	1216	1216
Crowdedness of the studied object's journey	Pearson Correlation	.135**	.044	.696**	1	.024	-.030	.005	.095**
	Sig. (2-tailed)	.000	.125	.000		.411	.294	.871	.001
	N	1216	1216	1216	1216	1216	1216	1216	1216
Whether the passenger travels alone or in group	Pearson Correlation	-.133**	.004	.004	.024	1	-.160**	-.106**	.049
	Sig. (2-tailed)	.000	.880	.884	.411		.000	.000	.085
	N	1216	1216	1216	1216	1216	1216	1216	1216
Object's age range	Pearson Correlation	-.085**	-.095**	.010	-.030	-.160**	1	.062*	.173**
	Sig. (2-tailed)	.003	.001	.738	.294	.000		.030	.000
	N	1216	1216	1216	1216	1216	1216	1216	1216
Object's gender	Pearson Correlation	.046	.001	.021	.005	-.106**	.062*	1	.060*
	Sig. (2-tailed)	.112	.962	.463	.871	.000	.030		.037
	N	1216	1216	1216	1216	1216	1216	1216	1216
Object's group	Pearson Correlation	-.206**	-.070*	.085**	.095**	.049	.173**	.060*	1
	Sig. (2-tailed)	.000	.015	.003	.001	.085	.000	.037	
	N	1216	1216	1216	1216	1216	1216	1216	1216

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Logistic Regression: Multitasking 12 (Talking with others)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	TranType	-.224	.167	1.796	1	.180	.799
	NumStops	-.008	.030	.066	1	.798	.992
	OverCrow	.107	.384	.077	1	.781	1.112
	IndiCrow	-.032	.236	.019	1	.891	.968
	TravelinGroup(1)	6.230	.359	300.762	1	.000	507.882
	AgeRange			5.767	5	.330	
	AgeRange(1)	.545	.571	.911	1	.340	1.725
	AgeRange(2)	.102	.606	.028	1	.866	1.108
	AgeRange(3)	-.276	.634	.189	1	.663	.759
	AgeRange(4)	.088	.713	.015	1	.901	1.092
	AgeRange(5)	.686	.728	.886	1	.346	1.985
	Gender(1)	-.219	.253	.749	1	.387	.803
	ScGroup			2.238	2	.327	
	ScGroup(1)	-.119	.557	.046	1	.831	.888
	ScGroup(2)	-.533	.438	1.478	1	.224	.587
	Constant	-1.828	.853	4.589	1	.032	.161

a. Variable(s) entered on step 1: TranType, NumStops, OverCrow, IndiCrow, TravelinGroup, AgeRange, Gender, ScGroup.

Logistic Regression: Multitasking 11 (Doing nothing or gazing out of the window)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	TranType	.141	.100	1.982	1	.159	1.152
	NumStops	-.077	.019	15.884	1	.000	.926
	OverCrow	.204	.227	.810	1	.368	1.227
	IndiCrow	.111	.139	.635	1	.425	1.117
	TravelinGroup(1)	-4.178	.461	81.995	1	.000	.015
	AgeRange			56.414	5	.000	
	AgeRange(1)	-.626	.359	3.052	1	.081	.535
	AgeRange(2)	-.441	.369	1.427	1	.232	.643
	AgeRange(3)	.430	.374	1.320	1	.251	1.537
	AgeRange(4)	.750	.428	3.065	1	.080	2.117
	AgeRange(5)	1.294	.472	7.518	1	.006	3.648
	Gender(1)	-.091	.152	.363	1	.547	.913
	ScGroup			1.928	2	.381	
	ScGroup(1)	-.305	.386	.625	1	.429	.737
	ScGroup(2)	.102	.270	.145	1	.704	1.108
	Constant	-.625	.546	1.309	1	.253	.535

a. Variable(s) entered on step 1: TranType, NumStops, OverCrow, IndiCrow, TravelinGroup, AgeRange, Gender, ScGroup.

Logistic Regression: Multitasking 7 (Messaging)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	TranType	.018	.117	.025	1	.875	1.019
	NumStops	.068	.019	12.474	1	.000	1.070
	OverCrow	-.239	.280	.725	1	.394	.788
	IndiCrow	.112	.177	.399	1	.528	1.118
	TravelinGroup(1)	-.896	.221	16.399	1	.000	.408
	AgeRange			14.376	5	.013	
	AgeRange(1)	.443	.374	1.400	1	.237	1.557
	AgeRange(2)	.286	.399	.512	1	.474	1.331
	AgeRange(3)	-.049	.422	.014	1	.907	.952
	AgeRange(4)	-.836	.588	2.020	1	.155	.433
	AgeRange(5)	-2.054	1.077	3.636	1	.057	.128
	Gender(1)	.199	.178	1.250	1	.263	1.220
	ScGroup			9.142	2	.010	
	ScGroup(1)	-.397	.370	1.147	1	.284	.673
	ScGroup(2)	-.797	.287	7.720	1	.005	.451
	Constant	-1.473	.588	6.284	1	.012	.229

a. Variable(s) entered on step 1: TranType, NumStops, OverCrow, IndiCrow, TravelinGroup, AgeRange, Gender, ScGroup.

Logistic Regression: Multitasking 5 (Listening to music/radio)

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	TranType	-.203	.134	2.294	1	.130	.816
	NumStops	.041	.023	3.245	1	.072	1.042
	OverCrow	.011	.320	.001	1	.972	1.011
	IndiCrow	.045	.199	.050	1	.823	1.046
	TravelinGroup(1)	-2.545	.369	47.466	1	.000	.078
	AgeRange			37.293	5	.000	
	AgeRange(1)	-.507	.337	2.257	1	.133	.603
	AgeRange(2)	-.966	.367	6.915	1	.009	.381
	AgeRange(3)	-3.476	.666	27.219	1	.000	.031
	AgeRange(4)	-3.579	1.059	11.431	1	.001	.028
	AgeRange(5)	-20.324	5127.393	.000	1	.997	.000
	Gender(1)	.359	.205	3.072	1	.080	1.431
	ScGroup			4.473	2	.107	
	ScGroup(1)	.083	.426	.038	1	.845	1.087
	ScGroup(2)	-.436	.360	1.471	1	.225	.646
	Constant	-.361	.631	.328	1	.567	.697

a. Variable(s) entered on step 1: TranType, NumStops, OverCrow, IndiCrow, TravelinGroup, AgeRange, Gender, ScGroup.

Logistic Regression: Effect of demographics on Frequency of using ICTs

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.701	4	6.925	13.361	.000[b]
	Residual	627.655	1211	.518		
	Total	655.355	1215			

a. Dependent Variable: Frequency of using ICT

b. Predictors: (Constant), Passengers of student group, Object's gender, Passengers of working group, Object's age range

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.671	.063		10.707	.000
	Object's age range	-.094	.018	-.162	-5.369	.000
	Object's gender	.142	.042	.096	3.417	.001
	Passengers of working group	.234	.081	.082	2.887	.004
	Passengers of student group	.063	.067	.028	.934	.351

a. Dependent Variable: Frequency of using ICT

Moderation effect: crowdedness to relationship of transport type and frequency of ICT s

```
**************************************************************************
Model = 1
    Y = Frequen
    X = TranType
    M = OverCrow

Statistical Controls:
CONTROL= AgeRange Gender   ScGroup

Sample size
       1216

**************************************************************************
Outcome: Frequen

Model Summary
          R       R-sq        MSE          F        df1        df2          p
      .2229      .0497      .5151    10.5356     6.0000  1209.0000      .0000

Model
              coeff         se          t          p       LLCI       ULCI
constant      .6291      .2402     2.6191      .0089      .1578     1.1003
OverCrow      .2241      .1403     1.5974      .1104     -.0511      .4993
TranType      .2358      .1022     2.3076      .0212      .0353      .4363
int_1        -.1505      .0631    -2.3861      .0172     -.2743     -.0268
AgeRange     -.0933      .0166    -5.6098      .0000     -.1259     -.0606
Gender        .1453      .0416     3.4936      .0005      .0637      .2268
ScGroup      -.0972      .0372    -2.6163      .0090     -.1702     -.0243

Product terms key:

 int_1    TranType    X     OverCrow

R-square increase due to interaction(s):
         R2-chng          F        df1        df2          p
int_1      .0045     5.6934     1.0000  1209.0000      .0172

*************************************************************************

Conditional effect of X on Y at values of the moderator(s):
   OverCrow     Effect         se          t          p       LLCI       ULCI
     1.2049      .0544      .0354     1.5382      .1243     -.0150      .1239
     1.6714     -.0158      .0282     -.5593      .5761     -.0712      .0396
     2.1379     -.0860      .0456    -1.8883      .0592     -.1754      .0034

Values for quantitative moderators are the mean and plus/minus one SD from mean.
Values for dichotomous moderators are the two values of the moderator.
```

Robustness White test: Multitasking 12 (Talking with others)

```
Criterion Variable
 Multitas

Model Fit:
       R-sq          F        df1        df2          p
      .7701   718.6635     8.0000  1207.0000      .0000

Heteroscedasticity-Consistent Regression Results
              Coeff     SE(HC)          t      P>|t|
Constant      .1574      .0558     2.8178      .0049
TranType     -.0092      .0092    -1.0006      .3172
NumStops     -.0003      .0017     -.1909      .8487
OverCrow      .0066      .0184      .3570      .7211
IndiCrow     -.0031      .0115     -.2738      .7843
Travelin      .8955      .0128    69.9284      .0000
AgeRange     -.0042      .0060     -.7004      .4838
Gender       -.0147      .0138    -1.0631      .2880
ScGroup      -.0168      .0133    -1.2659      .2058
```

Robustness White test: Multitasking 11 (Doing nothing or gazing out of the window)

```
Criterion Variable
 Multitas

Model Fit:
       R-sq          F        df1        df2          p
      .2401    70.2802     8.0000  1207.0000      .0000

Heteroscedasticity-Consistent Regression Results
              Coeff     SE(HC)          t      P>|t|
Constant      .1330      .0828     1.6059      .1086
TranType      .0120      .0156      .7723      .4401
NumStops     -.0106      .0028    -3.8200      .0001
OverCrow      .0380      .0355     1.0713      .2842
IndiCrow      .0123      .0215      .5697      .5690
Travelin     -.3861      .0192   -20.0810      .0000
AgeRange      .0676      .0096     7.0337      .0000
Gender       -.0131      .0232     -.5632      .5734
ScGroup       .0142      .0220      .6444      .5194
```

Robustness White test: Multitasking 7 (Messaging)

Criterion Variable
Multitas

Model Fit:

R-sq	F	df1	df2	p
.0511	8.3194	8.0000	1207.0000	.0000

Heteroscedasticity-Consistent Regression Results

	Coeff	SE(HC)	t	P>|t|
Constant	.3591	.0719	4.9951	.0000
TranType	.0043	.0132	.3228	.7469
NumStops	.0082	.0027	3.0829	.0021
OverCrow	-.0277	.0270	-1.0287	.3038
IndiCrow	.0106	.0163	.6531	.5138
Travelin	-.0937	.0186	-5.0253	.0000
AgeRange	-.0253	.0066	-3.8429	.0001
Gender	.0170	.0194	.8757	.3814
ScGroup	-.0563	.0214	-2.6274	.0087

Robustness White test: Multitasking 5 (Listening to music/radio)

Criterion Variable
Multitas

Model Fit:

R-sq	F	df1	df2	p
.1063	16.1633	8.0000	1207.0000	.0000

Heteroscedasticity-Consistent Regression Results

	Coeff	SE(HC)	t	P>|t|
Constant	.3892	.0648	6.0102	.0000
TranType	-.0139	.0124	-1.1251	.2608
NumStops	.0038	.0021	1.8135	.0700
OverCrow	.0077	.0270	.2858	.7751
IndiCrow	.0009	.0156	.0574	.9542
Travelin	-.1547	.0161	-9.6006	.0000
AgeRange	-.0590	.0063	-9.4314	.0000
Gender	.0281	.0172	1.6333	.1027
ScGroup	-.0266	.0177	-1.5066	.1322

Robustness White test: Effect of demographics on Frequency of using ICTs

Criterion Variable
Frequen

Model Fit:

R-sq	F	df1	df2	p
.0423	18.2890	4.0000	1211.0000	.0000

Heteroscedasticity-Consistent Regression Results

	Coeff	SE(HC)	t	P>|t|
Constant	.6714	.0583	11.5079	.0000
AgeRange	-.0943	.0143	-6.5728	.0000
Gender	.1423	.0421	3.3765	.0008
Dworking	.2339	.0857	2.7281	.0065
Dstudent	.0630	.0745	.8463	.3976