

# **The Cost of Achieving Equity in the Public Transportation Subsidies between the Dutch and the International Students in the Netherlands**

MASTER'S THESIS IN THE SPATIAL PLANNING PROGRAMME  
URBAN AND REGIONAL MOBILITY

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## **Abstract**

Having 122,000 international students, the Netherlands do not give them the same transportation subsidy that allows for the Dutch students. This creates a gap of inequity between the different students groups, as both groups share most of their demographic characteristics, so they share most of their needs. On the other hand, allowing the international students the same subsidy scheme allowed to the Dutch students would result in less revenue for the public transportation operators because the students would buy fewer tickets and depend on their allowed passes. The students would also use the public transportation more, so they might affect the public transportation operational plans for different means, which might not have the capacity to face the added usage of the international student, so the operational plans might include running extra trains, buses or other transportation means to face the new situation, so this would definitely add to the operational cost.

This research calculates the cost of allowing the international students the same subsidy scheme dedicated to the Dutch students through calculating the loss of revenues and check the added occupancy rates and relate it to the current occupancy rates for the different public transportation in the Netherlands to check if the current operational plans are capable to face these added trips, or that would result in more cost because of changing the operational plans. That led the research at the end to estimate the cost of allowing the international students the transportation subsidy scheme allowed to the Dutch students.

Keywords: Public Transportation, Subsidy, Students, Equity, Justice

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## Abbreviations

AStA	Allgemeiner Studierendenausschuss
DUO	Dienst UitvoeringOnderwijs
BDU	Brede Doeluitkering
EEA	European Economic Area
EU	European Union
Eurostat	European Statistical Office
GVB	Gemeentelijk Vervoerbedrijf
HBO	Hoger BeroepsOnderwijs
HTM	Haagsche Tramweg Maatschappij
MBO	Middelbaar BeroepsOnderwijs
OV-chipkaart	Openbaar Vervoer chipkaart
NRW	North Rhine Westphalia
NS	Nederlandse Spoorwegen
RET	Rotterdamse Electriche Tram
U-OV	Utrecht Openbaar Vervoer
VRR	Verkehrsverbund Rhein-Ruhr



## 1. Introduction

### 1.1 Students Transportation Subsidy in the Netherlands

The transportation operators in the Netherlands allow the users to use an OV-chipkaart by which the passengers pay their tickets/check in and load it with credit when needed. There are two types of the OV-chipkaart, the anonymous one and the personalized that can be used only by its owner (What is the OV-chipkaart?, 2019). Part of the university students in the Netherlands is entitled for a transportation subsidy to utilize public transportation. This happens through applying for a student travel product through the Education Executive Agency DUO, and then they can reload the student travel product to their personal OV-chipkaart (OV-chipkaart - Students, 2019). This provides the students with two options to reload their travel product, either a weekday pass which they can utilize public transportation for free around the week within the whole country or the weekend pass which they can use free transportation over the weekend only. They also have the benefit of using public transportation for free during the public holidays. (OV-chipkaart - Travel with the student travel product, 2019).

DUO performs different roles on behalf of Ministries of Education and Social Affairs; one of these tasks is “providing student finance and reimbursement of school costs” including the subsidy for the students’ transportation (Main tasks and organization chart - Organization - DUO, 2019). DUO has set a prerequisite for benefiting from the student travel product, which is being a student finance beneficiary. Consequently all students who are not eligible for the student finance are not eligible for the student travel product. (Apply for study finance - DUO for individuals, 2019).

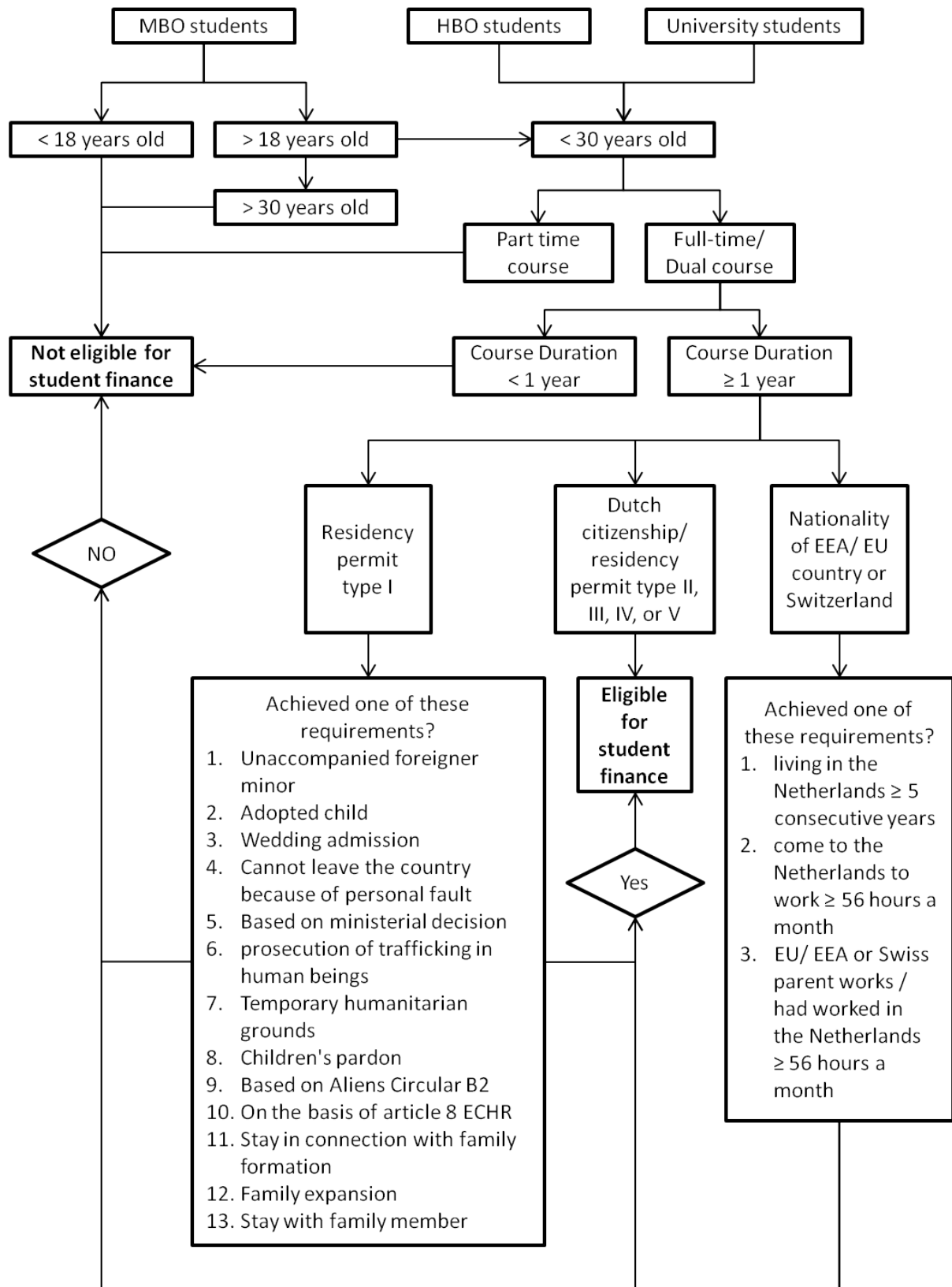
According to DUO, the eligibility to receive the student finance depends on the age, the study course, and the nationality or the residency of the applicant as shown in Figure (1). Regarding the students’ age, the non-covered students include only the MBO students under 18 years old and the new applicants who are over 30 years old, by the start date of the student finance. Meaning so if the student finance was received before turning 30 years old, it will not be terminated due to the age limit, and meanwhile if the student ends it if he is 30 he cannot resume it again. For the studying course, it must be a full-time or dual course which lasts at least one year. The last requirement that needs to be fulfilled for the student finance is being Dutch or having certain types of residency permits which this research will be focusing on. DUO classifies the students into the three following categories:

1. Dutch students/ students have resident permits type II, III, IV or V, and these are eligible for the student finance.
2. Students who has the nationality of EEA/ EU country or Switzerland, who are also eligible for the student finance if they achieve one of the following conditions:
  - a) The student lived in the Netherlands for five consecutive years or more before applying to the student finance.
  - b) The student came to the Netherlands to work 56 hours a month or more.

- c) One of the parents of the student is an EU/ EEA or Swiss citizen who work/ had worked in the Netherlands for 56 hours a month or more.
3. Students have resident permit type I, they are eligible if they fulfil one the of following conditions:
- a) Unaccompanied foreigner minor.
  - b) Adopted child.
  - c) Wedding admission.
  - d) Cannot leave the country because of personal fault.
  - e) Based on ministerial decision.
  - f) Prosecution of trafficking in human beings.
  - g) Temporary humanitarian grounds.
  - h) Children's pardon.
  - i) Based on Aliens Circular B2.
  - j) On the basis of article 8 ECHR.
  - k) Stay in connection with family formation.
  - l) Family expansion.
  - m) Stay with family member (Eligibility for student finance, 2019).

Figure (1) The eligibility of students to receive the student finance

Source: (Eligibility for student finance, 2019)



After presenting the eligibility of the different groups to receive the student finance, this research will be focusing on one of the groups who are not eligible for the student finance

and consequently the students' product, specifically those who are excluded because of their nationality/ type of residency. Adding this group to the subsidized groups would achieve the horizontal equity which promotes for equal treatment of equals and the vertical equity which promotes for the distribution of subsidy based on the affordability of the different groups (Litman, Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning, 2018, p. 3).

The mentioned types of equity would be achieved by applying the subsidy to the disadvantaged group regardless their nationality/ type of residency, as the same group of students would be treated equally, on the other hand the older students who exceeded the age of 30 would not be classified as a part of this equals as they had the chance to gain more income and can generate more income compared to the younger students or the ones who did not interrupt their study career for full time jobs (Guvunen, Kaplan, & Song, 2014, p. 24), the students of the other courses that are not eligible for qualifying the students to the student finance would not also be classified as equals, where this subsidy was set to encourage the students to pursue certain courses based on different national and regional factors (Hearn, Griswold, & Ginger, 1996, p. 242). Based on this, not subsidizing a group of students only because of their nationalities/ types of residency is neither achieving the equal treatment of equals, nor favouring the group of having less affordability. In addition to that, this would be considered as an institutional racism which is preventing an ethnic group, asylum seekers, or another disadvantaged group from having the same level of accessibility to economic resources, education and different goods and services (Phillips, 2011, p. 173).

## 1.2 Research Problem

Allowing the international students to have the same subsidy scheme the Dutch students have, which is being allowed to choose to have free weekday or weekend transportation passes would result in achieving the missed equity between the two groups. This would also result in a direct and indirect financial loss for the public transportation operators. The direct cost comes from losing the revenues of the tickets and subscriptions that the international students purchase currently, and they would not buy if they have the weekday or weekend passes, as this would be a direct deduction from the revenue of the public transportation operators. The indirect cost comes from changing the operational plans of the public transportation means by adding more passengers/ passenger kilometers to the current operational plans, as the one of the items controlling the elasticity of the passengers is the fare of the public transportation (Litman, Evaluating Public Transit Benefits and Costs: Best Practices Guidebook, 2018, p. 10). One of the main side effects and the obstacles facing achieving equity in transportation between the Dutch and the international students in the Netherlands is the cost of this equity, so this research tries to calculate the direct and indirect costs resulting from achieving this equity.

### 1.3 Research Aim

Identify the current usage of the transportation for the non-subsidized students and the change that would happen as a result of applying a subsidy scheme which achieves the equity between the different groups of students. This would be an entry point to identify the additional costs resulting from the increased number of passengers using the public transportation in the Netherlands and as a result, this research would be able to promote for policy interventions to fill this social gap.

### 1.4 Research Questions

- What would be the change in the revenue of the public transportation in the Netherlands if the subsidy scheme of public transportation achieved the social justice between Dutch and international students? What are the current expenditures of the international students in the Netherlands on purchasing public transportation tickets?
  - What are the current expenditures of the international students in the Netherlands on public transportation subscriptions?
  - What would be the change of the travel pattern of the international students if the subsidy scheme of public transportation achieved the social justice between Dutch and international students? What is the current passenger kilometers conducted by the international students in the Netherlands?
- What would be the increase in the operational cost of the public transportation in the Netherlands resulting from the increased number of passenger kilometers conducted by the international students due to the proposed change in subsidy scheme?
  - What would be the increase in the number of passenger kilometers conducted by the international students in the Netherlands if they were allowed the same transportation subsidy scheme the Dutch students have?
- What are the proposed policies to achieve transportation equality and equity between the different groups of students in the Netherlands?

### 1.5 Societal Relevance

The public transportation in the Netherlands is not subsidized for a proportion of the international students and is partially subsidized for the Dutch students (Studentenreisproduct, 2019). This affects the students' affordability to use the public transportation, as in general, students do not have full time salaries. Not allowing part of the international students the same subsidy of public transportation usage given to other groups of students, adds a financial burden on them as it prevents a fragment of them from living outside the cities where their universities are, as they cannot afford financing two ways daily trips to their educational institutes even if the rental fees in the smaller cities are cheaper. This also limits their accessibility to spend their free time in other places, visiting different locations and apply for some jobs or internships. In

addition to that, their accessibility to different recreational activities will increase. On the other hand, giving the same subsidy of transportation to the different groups of students would achieve the transportation equality and equity.

Although this proposed subsidy will affect the state financially, as the running cost of the public transportation will increase by increasing the passenger kilometer (van Goeverden, Rietveld, Koelemeijer, & Peeters, 2006, p. 10), but it would also has number of advantages to the state, as it will distribute part of the economic activities among the smaller cities, towns and villages. In addition to that, giving the students the access to different recreational activities would enrich their social life, and for the international students, they will be able to integrate easier with the community and this would be considered as an assist to promoting the Dutch culture to them. This research also considers achieving equity between the different groups as a primary target that has to be reached even if it costs.

## 1.6 Scientific Relevance

“The choice for the level of subsidies in public transport is of course a political one and hence cannot be made on the basis of scientific research only” (van Goeverden, Rietveld, Koelemeijer, & Peeters, 2006, p. 24). Although setting a transportation subsidy is a political decision that is not depending only on the scientific research, but the scientific research would be the start, as it would propose the idea, raise the actual needs, costs and builds on the existing theories to promote for setting the subsidy, and this is the base of the scientific relevance of the research.

This research follows one of the main trends in social sciences that sets broad definitions which includes the international students, expats and foreigners living in certain geographic areas in the definition of a community, as they share the same location, governed by the same law and following the same range of social interactions (Diaz, 2000) . Based on that, the research proves that the social justice is not achieved through the current applied system of transportation subsidy, as it differentiate between the community members according to their nationalities and residency types.

Achieving the social justice in transformation subsidy between the different groups of students through allowing the international students the same subsidy scheme the Dutch students have would result in more usage of the public transportation. Additional to the loss of the income coming from the sold tickets, the proposed subsidy scheme will add more passenger kilometers to the transportation system in the Netherlands. Although different scholars mention estimations for the elasticity rates resulting from changing the transportation fares, but according to Litman, they differ from a case to another according to the different demographic setups, geographic nature, social setup and economic situation (Litman, *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, 2018, p. 18), so this study explores a specific elasticity rate resulting from changing the public transportation fare in a certain location which is the Netherlands for a certain group which is the international students. The

change of users' behaviour resulting from the elasticity rate after achieving the social justice between the different groups of students would result in additional passenger kilometers which might affect the operational cost by the need of more labour, utilities and means of transportation to face this need (Edrington, et al., 2014, p. 62). These costs would be calculated only if the occupancy rate of any of the public transportation means exceeds the 100%; otherwise, the increased number of passengers/ passenger kilometers would make use of the existing surplus capacity in the transportation system (Peak Occupancy Rate, 2014).

### 1.7 A Students' Initiative to Develop the Current Unfair Situation

The current transportation subsidy scheme assigned for students does not include groups of university students because of their nationalities, as the international students are not allowed to have this subsidy (Apply for study finance - DUO for individuals, 2019). This creates a feeling of inequality for the international students who cannot have this service just because they are internationals. An initiative was taken in the academic year 2018-2019 to fill this gap. The initiative tries to gather online signatures from the international students to raise a petition to the European Commission supporting the demand of the international students to have equal opportunities the national students have. (Toubasi, 2019)

The petition mentioned there were for 122,000 international students in the Netherlands who suffered going to another a new country, some of them passed by an unclear visa processes, rising of tuition fees, limited ability to work and difficulties in finding accommodation because of the language barriers. The petition highlighted also that the Netherlands has the most expensive public transportation system for the passengers among the 28 EU countries according to Eurostat. As an international student, not having any kind of subsidy is adding a burden, as most of them have limited budgets. Not having any discounts limits the choices of the students when they decide to visit other cities, having weekend trips or moving freely for any other reason. The petition also mentioned that including the international students in the current subsidy scheme would attract more international students to study in the Netherlands. (Toubasi, 2019)

This initiative was taken by Lina Toubasi, a Palestinian student who is doing her bachelor in International Business Communication at Radboud. As an international student, Lina thinks that the public transportation in the Netherlands is expensive for the international students that led to collecting around 3,000 signatures on the petition at the first week. According to Eurostat, the residents in the Netherlands pay 32% more than the average on their transportation compared to the other EU countries. In addition to that, the fact that the transportation is subsidized for the Dutch students leads to the current "unfair" situation she wants to change. Lina also compared this subsidy scheme to the subsidy schemes for the students in Germany and the Czech Republic which do not differentiate between the national and the international students. (ten Broeke, 2019)

Lina planned to study courses in Amsterdam to be facilitated for her to do a pre-Master's later, but the price of a one way ticket from Nijmegen to Amsterdam without any discount exceeds the €20, so she was not able to have these courses because she was not able to afford the transportation cost. This situation is not limited to Lina only, but it includes different international students who want or required to do internships, but it is difficult for them to afford the transportation fees. Also the students in a city like Nijmegen, where Radboud University is located in, do not have many internships opportunities for English speakers. Consequently, a part of the international students go to the bigger cities like Den Hague and Rotterdam, and they are exposed to the same situation. (ten Broeke, 2019).

The international students positively interacted with this petition, as after the first month this petition was published, more than 7,397 students signed on the petition. Considering that the international students at Radboud University are only about 3,300 (Facts & figures - Radbud University, 2018), so the petition was signed by more international students that the number Radboud has, this means that the international students in other universities in the Netherlands interacted with the petition. Also this number representing more than 6% of the total number of students in the Netherlands, and it was reached in a short period of time (Toubasi, 2019).

After collecting more signatures, Lina wanted to send a letter to the government in the Netherlands, as she believes that the university and the government share this responsibility. Lina promotes for subsidizing the public transportation of the international students and this would be financed by two parties. She stated that this project could be partially financed through the tuition fees paid by the students and the other part would be financed by the Dutch government which is responsible for all the people living in the country, as the government accepts those internationals students to come to the Netherlands and to be a part of the community (ten Broeke, 2019).



## 2. Literature Review

### 2.1 Equity in Public Transportation

Transportation as a service is not the end goal service, as the evaluation of the transportation is performed based on indicators which do not reflect the satisfaction of the user such as; roadway level of service and traffic speed. The main objective of the transportation is the accessibility, which is the ability of people to reach their aimed activities and services. The transportation network, mobility and distribution of the activities are affecting the accessibility, but they are not the only factors, affecting the accessibility, as it is strongly affected by the affordability of the people to use these transportation networks and means of transportation. (Litman, Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning, 2018, p. 6)

There is a threshold for achieving equity in public transportation, which is having the basic accessibility and mobility levels. To have these basic levels of accessibility and mobility means that each person in a certain community has the ability to reach the basic and essential activities and services. Litman identified these activities and services as the education and employment, some social and recreational activities, emergency services, health care services and basic food and clothing. For achieving the basic accessibility or raising the accessibility levels for certain groups, subsidies for public transportation takes place, as subsidizing the disadvantaged groups is a kind of distributing equity. The analysis of transportation equity differs from a community to another according to their determination of the basic goods, activities and services. Therefore achieving the transportation equity might expand to include subsidies for more people. (Litman, Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning, 2018, p. 7)

As the transportation service is the most expensive service in Europe (Ammar, The Dutch transportation is the most expensive in Europe, 2019), the international students as a group of limited resources might be facing some difficulties in achieving equity in accessibility levels, as they might be having limited accessibility levels to some social and recreational activities and this limitation might also include educational activities in some cases. The international students' limitation to these basic services due to the high fares of transportation is discussed in the Results and Findings chapter.

### 2.2 Subsidies of Public transportation

One of the options to achieve adequate accessibility levels to a certain group of people with specific characteristics is subsidizing their transportation. These characteristics include living in a certain geographic location and have limited financial resources like the international students in the Netherlands. The public transportation, including the different types of providing transportation means plays a significant role for providing mobility to the general

public. By assuring a basic affordable mobility system to the non-drivers, the public transportation is essential for an equitable and efficient transportation system, providing an efficient urban travel and playing the catalyst role for developing the efficiency of the land use planning. Although the public transportation may have high costs, it has positive direct and indirect effects internally and externally that would not be limited to the public transportation users, in addition to have a direct positive effect on the land use planning besides the direct effect of raising the ability of transit to the users (Litman, *Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning*, 2018, p. 19).

In the article “Subsidies in public transport”, the authors stated that subsidizing the public transportation was introduced in the second half of the 20<sup>th</sup> century, as the private cars usage expanded and the fares of the public transportation were increasing. At that time, some countries started subsidizing the public transportation to cover this gap. Subsidizing the public transportation was practiced because of its “social function”. This would give an advantage to the low income groups- those who do not have cars, handicapped and elder people- as they need to have an access for transportation to avoid being socially excluded. In addition to that, depending more on public transportation helps in overcoming other challenges such as; noise, congestion, pollution and parking externalities. As a result, subsidizing the public transportation might add load to the governments’ budgets, however it might lead to the pre-mentioned positive outcomes (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 6). The university students also would be added to the mentioned groups, as most of the students do not have full time jobs because they are engaged with their studies activities (Guvenen, Kaplan, & Song, 2014, p. 24). There are wide differences in policies of subsidizing public transportation, as there are models offering free public transportation schemes, while other applied models tend to apply cost coverage, and between those two extremes, most of the European countries apply partial cost recovery models (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 6).

The authors classified the transportation subsidies into three types; the first one is the total free public transportation, and the authors gave Leiden-The Hague free bus as an example, as the free service was offered for all the passengers on two different lines. The second type is the public transportation that offer free service for a certain group of passengers or for certain periods during the day, and the example for that is the tams, buses, and metro in different cities that offer free services to the senior citizens, children, and disabled people. The third type of transportation subsidy is offering reduced fares of public transportation regardless the location or the group of passengers. There is an existing Dutch example for this type of subsidy which is the 40% discount that the passengers can get through the reduction card. (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 7)

### 2.2.1 The consequences of subsidizing the public transportation

Although subsidizing transportation for a certain group would increase the accessibility levels of a certain group- the international students in the Netherlands- to the basic services,

this subsidy might have other effects on the state and the transportation operators. Subsidizing the public transportation for a certain group of the community or for the entire community might increase is inversely proportional with the transit travel demand. Litman gave an example for that by assuming that there is a particular transit route which attracts 5,000 daily riders without subsidizing any group of the community, if the employers were subsidized, the number of riders might increase to 6,000 per day, and it could reach 7,000 if a local college has subsidized passes for the students. Litman tried to raise a simple example for the effect of subsidizing the public transportation on the travel demand; however he mentioned that the subsidy or the pricing in general is one of the factors affecting the travel demand. The other factors are affecting the travel pattern such as; the demographic, economic, geographic, social factors, the offered transit services and the transit orientation pattern. (Litman, Evaluating Public Transit Benefits and Costs: Best Practices Guidebook, 2018, p. 17)

Litman classified the effects of different “Transit Ridership Factors” on the transit travel demand weighing each of them as shown in Table (1). Although transit dependent riders would have lower elasticity percentages, Large cities have lower elasticity percentage than small ones, and the peak hours elasticity percentage is less than the off peak hours, and the factors Litman mentioned are not representing an accurate reference that predicts the change of travel behaviour in each of those situations because the travel elasticity might also be affected by the geographic, demographic and service factors, these numbers would give a rough estimates to the consequences of definite proposed changes.

The weight given for each of the factor is the elasticity weight for increasing each of the given factors by 1%. This means if the regional employment in a region where a certain public transportation system is applied and certain number of daily passengers is using this system increased by 1%, the total number of passengers using the public transportation in that region would increase by 0.25%. The given weight for elasticity for the fare price is estimated by some of the scholars such as Kain and Liu by -0.32%, while Litman stressed more on another rate which is 0.4%, and this rate is supported also by other scholars such as Hensher, King and Prat. That means that the increase of the prices by 1% will decrease the number of public transportation users by 0.4% (Litman, Evaluating Public Transit Benefits and Costs: Best Practices Guidebook, 2018, p. 18). This means also that the number of passengers will increase if the fare was decreased, or the public transportation was totally subsidized.

Table (1) Transit Ridership Factors

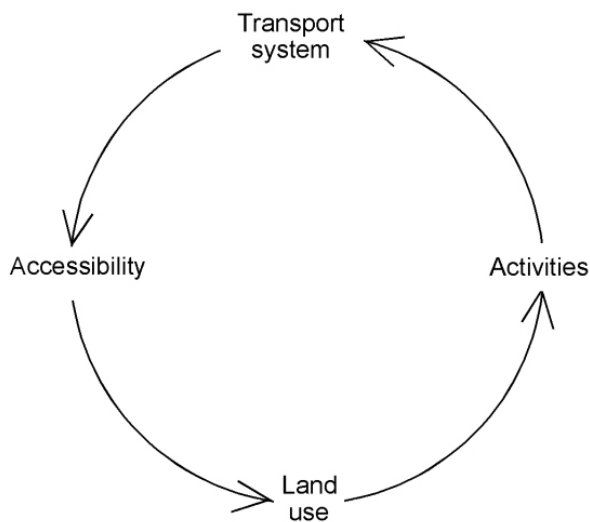
Factor	Elasticity
Regional employment	0.25
Central city population	0.61
Service (transit vehicle mileage)	0.71

Fare price	-0.32
Wait time	-0.30
Travel time	-0.60
Headways	-0.20

Source: (Litman, Evaluating Public Transit Benefits and Costs: Best Practices Guidebook, 2018, p. 18), derived from (JHK 1995; Kain and Liu 1999)

According to Litman, decreasing the prices of the tickets or subsidizing the public transportation would increase the usage of this service, thus the passenger kilometers and the mobility will be increased. Increasing the mobility through increasing the public transportation means passenger kilometers will add a load on the public funding, especially if the public transportation was subsidized. However, the effect of providing cheaper or subsidized public transportation is not limited to increasing the mobility and putting a load on the public money, as the land use transport feedback cycle introduces more effects to increasing the accessibility as shown in Figure (2). Wegener and Fürst highlighted a fact stating that trip and location decisions are co-determining each other. As a result, land use planning and mobility planning should consider each other as they are closely linked and each of them is affecting the other (Wegener, 1999, p. VI). The authors started explaining this cycle from the lower point, which is the land use, but since it is a closed complete cycle, it could be started from the top one which is the transportation system. Decreasing the fares of the public transportation or subsidizing it to a certain group of the community would create more opportunities for spatial interactions which mean providing better accessibility. This better accessibility is considered as mentioned before as a reason for co-determining the location decisions, thus it would be resulted in changing the current land use plan. That would lead in different locations to the distribution of different uses of land such as; residential uses, commercial uses, working places, and other human activities on the accessible cites. (Wegener, 1999, p. VII)

Figure (2) Land Use Transport Feedback Cycle



Source: (Wegener, 1999, p. VII)

Increasing the mobility and enhancing its infrastructure in a region for the users or part of them affects the community economically on the different levels. It would act as a catalyst for the productivity growth, as the labour/ part time labour would gain more accessibility to different jobs and that would form an addition to the total state capital. On the regional and the local levels, that increase in the mobility for the users or part of them might affect also the employment activities besides the housing and retail activities as their locations, as the accessibility of certain locations might be increased (Meurs, 2019).

Increasing the passengers kilometers after subsidizing the public transportation may lead to changing the operational plans of the public transportation and increasing the operational cost. Hasselt city in Belgium had this experience, as it offered a free public transportation system in 1996. The reason for this subsidy was to enhance the bad condition of mobility at the city, as there were two main lines that had an hour frequency either during the peak hours and the off peak hours, as the public transportation was not very popular there. The aim of “De Lijn” -the operator of the public transportation there- was to multiply the number of trips conducted by public transportation in the city by 4 in the following three years. After introducing the new subsidy, 63% of the bus users were former users but they started to conduct more trips, and 37% were non bus users, and the number of passengers using the urban bus is increased from 331,551 to 3,200,000 after introducing the subsidy. On the other hand, the regional bus that was not subsidized did not experience a significant change in the number of passengers. To overcome the increased demand, the number of buses were increased from 8 to 40, the number of lines increased from 4 to 9 and the frequency of the buses increased from 1 hour to 15 min in the peak hours and 30 min in the off peak hours. (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 10)

Another experience was documented in Brussels in 2003 starting from the academic year 2003/2004; as students of Dutch speaking universities were allowed an annual flat rate for transportation all over the city. In this year, the students were allowed a seasonal ticket for €10 just to cover the administrative cost, and in the next year the fare was increased to €25. This

new policy had different objectives while the original price was €200. This aimed at attracting the Flemish students to participate more in the cultural, social, sports and different activities taking place in Brussels and increase the number of Dutch speaking students in Brussels. As a reaction to this project, 47% of the Dutch speaking students applied for this seasonal ticket, and 89% used the public transportation regularly. For the seasonal ticket users, 35% used the public transportation more frequently, and 13% were nonusers of public transportation before, so the passenger kilometers had increased. The increase of the ridership of the students did not affect the operational plan either by introducing new lines or updating the frequencies, but this added to the cost an additional subsidy of €1,446,293 but the public transport network and frequencies were not changed. (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 12)

This research measures the effect of allowing the international students subsidized public transportation on their ridership. It also tests how this would affect the operational plan of the different mean of transportation in the Netherlands. According to Litman, decreasing the fares of the transportation fares affects the elasticity and will result in more trips and passenger kilometers. The presented cases show that in Hasselt, the number of bus operating was multiplied by 5 after providing the citizens with free buses service to be able to accommodate the new level of demand. There is another different experience from Belgium which was presented to subsidize the transportation of the students of the Dutch speaking universities in Brussels. This project resulted in increasing the ridership of some of these students without affecting the operational plans, so the operational costs were not changed. Another significant difference between the two cases was the target group of each case, as in Hasselt, the whole population of Hasselt was allowed to have the free bus service, while in Brussels, only the students of the Dutch speaking universities were the target group, so they were limited part of the population of the city which leads do different effects on the operational plans at the end. One of the main approaches of this research is to determine whether the added passenger kilometers conducted by the international students in the Netherlands if they were subsidized would not affect the public transportation operational plans like the case of Brussels, or it would affect like the case of Hasselt. Thus this cost has to be calculated.

### 2.3 Subsidies of students in the Netherlands

The article “Subsidies in public transport” also discussed fully subsidizing the public transportation for students in the Netherlands that started in 1991. This subsidy allowed the students to freely use the different public transportation (e.g., bus, train, metro, and tram) unlimitedly throughout the year, but this subsidy was limited only to the students who receive the student grants. Offering this subsidy led to increase in the usage of the students to the public transportation, and this was documented in different ways:

1. The share of the public transportation in the total number of the students’ movements increased from 11% to 21%
2. The average usage of public transportation per student per day increased from 0.45 times to 0.81 times

3. The average kilometers travelled by students increased by 15%
4. The bike usage of the students decreased by 52%, while their car usage was decreased by 34%
5. The increased number of movements of the students increased more for the bus, tram and metro usage during the weekdays and for the train usage during the weekend days
6. The total number of passenger train kilometer increased by 36%, as it was 11,000 million before applying this subsidy and in 1991 it became 15,000 million

To overcome this increase in the train usage, more trains were added to the network to balance the increase in train kilometer per passenger. Later on, in 1994, the students' free public transportation was replaced by another partially subsidized OV-studentenkaart to limit this over usage. (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 11)

Since 1994, there have been different attempts done by the government to cancel the student pass, but every time these attempts were faced by strong resistance from the student advocacy boards. The previous coalition government agreed initially to cancel the student pass, however after the strong protests conducted by the students, the government changed its plans and went further step by extending the student pass to further education college students. (van de Velde & Eerdman, Devolution, integration and franchising - Local public transport in the Netherlands, 2016, p. 17)

The student finance Act 2000 allows part of the students in the Netherlands who are over 18 years old if they are enrolled in full time educational programs to cover their educational costs. The new system which is applied starting from September 2015 is concerned by the higher education students. The system consists of three main financing components which are a loan, student public transportation subsidy and supplementary grant. The loan has to be paid back within 35 years, but for the grant and the public transportation subsidy, the student only has to pay them back if he is graduated within more than 10 years, otherwise, he does not have to pay them back, as they might be considered as a gift. (Vocational education and training in the Netherlands, 2016, p.22)

Before introducing the new transportation subsidy for students in 1991 and modifying the subsidy scheme in 1994, another transportation type of transportation subsidy was given to the students, as they were given a travel allowance. The new system decreased the administration cost that was assigned for managing the old travel allowance, and the students were benefited from allowing them to travel without the restrictions of the old travel allowance (van de Velde & Eerdman, Devolution, integration and franchising - Local public transport in the Netherlands, 2016, p. 17). The new system is managed through cooperation between the Ministry of Education and the transportation operators. This contract and the relations between the different stakeholders are not static. They are subjected to modifications and changes that make the contract and the relations between the stakeholders more flexible. (van de Velde, Eerdman, & Westerink, Public Transport Tendering in the Netherlands, 2010, p. 8)

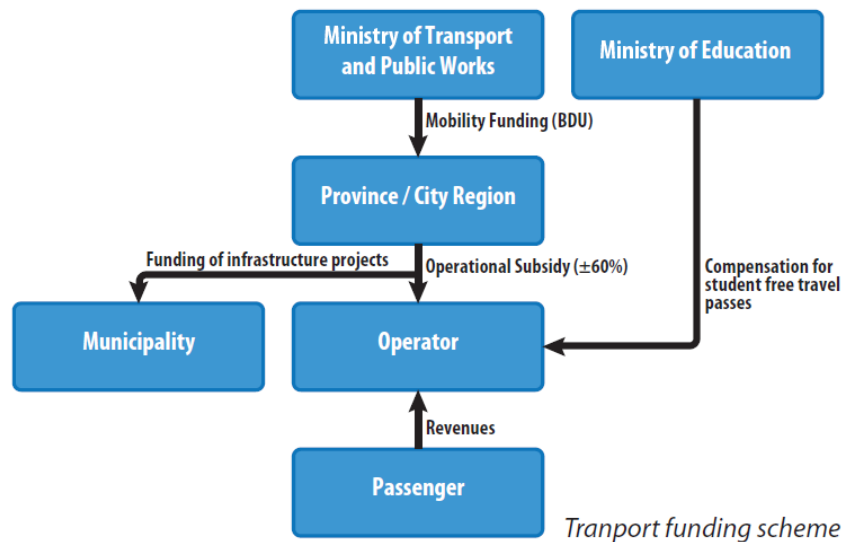
One of the initiatives took place in the province of Fryslân, as it was developed by Arriva and it aimed to decrease the number of passengers in the peak hours for some trains and buses lines. This initiative encourages the students not to travel within the peak hours voluntarily to reduce the peak loading. There are also other special contractual arrangements take place between the operators and the public transportation authority. One of these arrangements is the annual revaluation that is conducted for some routes in the Province of Gelderland, if the cost coverage decreased to less than 50%, the operator has to come up with marketing plans for the students to raise their usages for this line. If the marketing plans did not achieve sufficient results, the line can be cancelled. There are exceptions for these cancellations especially for the bus lines that connect the educational institutions with certain locations. (van de Velde, Eerdmans, & Westerink, Public Transport Tendering in the Netherlands, 2010, p. 8)

The amount of the contract between the Ministry of Education and the transportation operators varies from a year to another, as the amount of the contract was €300 million in 2009 (van de Velde, Eerdmans, & Westerink, Public Transport Tendering in the Netherlands, 2010, p. 18), and it increased to reach €700 million in 2016. This amount of money is considered to be one of the main sources of revenue to the public transportation in the Netherlands (van de Velde & Eerdmans, Devolution, integration and franchising - Local public transport in the Netherlands, 2016, p. 17).

Figure (3) highlights the contribution of the Ministry of Education to the mobility funding scheme, as they receive the subsidy of transportation of the students in front. The Ministry of Transport, Public Works and Water Management pays the provinces a block grant called BDU. This BDU is assigned for the public transportation operation and projects smaller than €112.5 million (Metz, 2011, p. 6). The provinces distribute the funds among the operators as an operational subsidy, and the municipalities to fund the infrastructural projects. The operators have other sources of finance which are the revenues they got from the passengers in the form of the tickets they sell to the passengers, and from the Ministry of Education as a compensation for the free travel pass, they give to the students. (van de Velde, Eerdmans, & Westerink, Public Transport Tendering in the Netherlands, 2010, p. 7)

Figure (3) Transportation funding scheme





Source: (van de Velde, Eerdmans, & Westerink, Public Transport Tendering in the Netherlands, 2010, p. 8)

The introduced subsidy in 1991 helped in increasing the accessibility levels of the students' basic accessibility levels mentioned in 2.1, but the excess usage of the students let the state try to cancel this subsidy and limit it starting from 1994 by allowing the students either weekday or weekend passes. There are limited data for the exact effect of the usage increase on the operational plans between 1991 and 1994, but it was stated that the number of passenger kilometers on the national level increased from 11,000 million to 15,000 million passenger kilometer annually because of this subsidy, so it was limited in 1994 (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 11). This subsidy also was not allowed to the international students who were not living in the Netherlands before their studies and their parents were not working in the Netherlands (Eligibility for student finance, 2019), although all the international students in the Netherlands form only 18% out of the total students population in the country (Key figures, 2018). Therefore the major effect of the subsidy on the operational plans is already enforced, as 82% of the students are already subsidized, and also the students would be allowed only limited flat rate transportation either on the weekends or the weekdays, so the effect of the extra usage would be much limited.

#### 2.4 Subsidizing the transportation of students in NRW

NRW is a German state which could be compared to the Netherlands in the field of subsidizing the transportation of the students. NRW and the Netherlands have almost equal number of populations and surface areas, as the population of NRW is 17.9 million, while the population of the Netherlands is 17.1 million. Thus the difference in population is less than 5%. For the surface area, the difference between them is less than 1%, if the water surfaces of the Netherlands were excluded, as the surface area of NRW is 34,113 km<sup>2</sup>, while the surface area of the Netherlands is 41,528 km<sup>2</sup> including around 18.4% of water surfaces (Facts & Figures, 2014) (Nordrhein-Westfalen, 2011). This gives comparable number population

densities for both of them. Although the population density of the Netherlands is around 411 inhabitant/ km<sup>2</sup>, while the density of NRW is around 525 inhabitant/ km<sup>2</sup>, which gives a difference of around 20%. If the water surfaces of the Netherlands were excluded, the population density of the Netherlands would be 504 inhabitant/ km<sup>2</sup>, which is only less than the population of NRW by around 4%.

The transportations subsidy model for the students in many parts in Germany depends on the “Semesterticket” which is mandatory for all the students in Germany. In this model, all the students have to pay the fee of the “Semesterticket” and they can use the public transportation for free (Voss, 2015, p. 263). The fees of the Semesterticket slightly differ from a university to another in within the NRW, although the students receive the same service. There is a student council which represents the students’ interests towards the university and also the public bodies in each German university called AStA (AStA, 2019). This council as a representative of the students is responsible for offering the Semesterticket service, as it negotiates the region and the fee of the Semesterticket with the transportation bodies, concludes the contracts and decides the fees of the Semesterticket (Semester ticket, 2017). This creates small differences between the fees of the Semesterticket from a university to another within the NRW, as the fees of the Semesterticket for the academic year 2018/2019 for the students of the University of Munster is €178.60 (Semester fee, 2019), for the students of TU Dortmund is €196,62 (Merkblatt über die Zahlung von Semesterbeiträgen, 2018) and for Ruhr University Bochum is €203.88 (Social Contribution, 2018).

The Semesterticket in Germany was proposed by the student councils to the transportation operator companies, and after that the two parties went for negotiations which were approved by a referendum. A constitutional complaint was rejected by the German Federal High Court in 2000 against the Semesterticket. According to the court, the target of the Semesterticket is to reduce the living expenses in Germany, and it decided that the ticket should be mandatory for all the students, to allow the students to get higher discounts. On the financial side, making the subscription to the semester ticket mandatory gives the advantage to the transportation operators to add to their cost recovery, as they are paid by all the students, while the services are not used by part of them. Thus the car owners are contributing to the Semesterticket as solidarity according to the student committees. (Voss, 2015, p. 264)

After applying the Semesterticket, the students stopped calculating their transportation cost, so their public transportation usage increased strongly. As a result, the public transportation usage in general was increased and that led to the increase of the market prices of tickets. However, the price per ticket was decreased because of the student ticket in Germany from 1991 to 2014 only by 1.74%. One of the reasons for introducing cheaper tickets offered to students is delivered from the unlimited access program which was applied at the US universities. The author highlighted a related result stating that the students are more likely to travel at off-peak hours compared to other passengers, so they can be used to fill the empty seats in the buses and trains. This also defines the low increase of price ticket that took place in Germany after applying the Semesterticket. In general, the Semesterticket is cheaper than the normal monthly pass because they are subsidized by the local governments, given the fact that not all the subscribers are using it, the Semesterticket fees is negotiable because of the

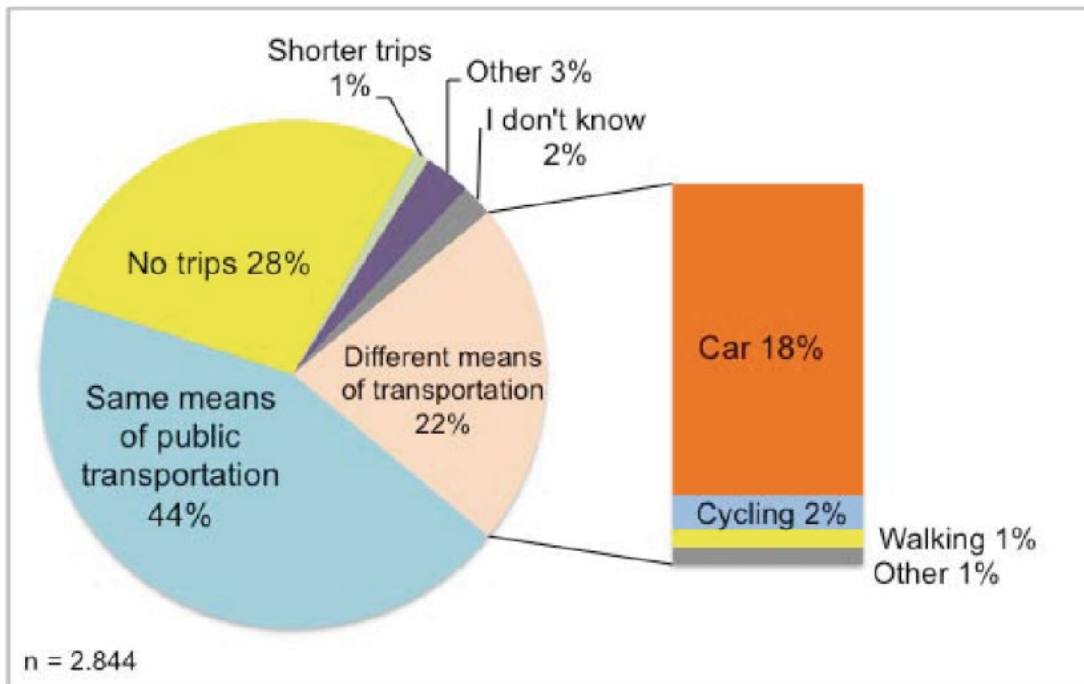
large number of students who are included in the negotiations and the duration of the ticket which is six months. (Voss, 2015, p. 264)

Having only one state-wide tariff in the NRW which is “NRW-Tariff” responsible for the local and the regional public transportation within the state facilitated achieving the Semesterticket covering the entire state, as the student representatives were negotiating with a single body. Despite that, the Semesterticket differs from a university to another within the same state; this takes place because each university has a different framework for the Semesterticket, as the various types of tickets used by the different universities include chip on student card, print tickets, and paper tickets. (Müller, 2016, p. 9)

When the Semester ticket was introduced in the NRW, many Semestertickets were only valid in one city, the city where the university is located. When the student representatives were more organized, they were forming joint forces to negotiate with the transportation operators for more benefits to the students. An example for that are the universities in the Ruhr region, as they succeeded to negotiate for larger geographical boundaries for the Semesterticket for the students of the universities located at the region. The Semesterticket at that time covered the public transportation within the entire region of the VRR which includes 20 universities. In 2008, more collective joint forces were formed, as the representatives of the universities in the NRW negotiated a Semesterticket covering the entire state. The new Semesterticket now covers an area of 34,000 km<sup>2</sup>, 29 cities of more than 100,000 inhabitants and is used by more than 500,000 university students in the NRW. Other German states experienced the same developments such as; Brandenburg, Saxony and Lower Saxony, as the Semestertickets offered to cover the whole state. (Müller, 2016, p. 9)

For assessing the effects of the NRW Semesterticket, an online survey was conducted by Müller targeting the students of Bielefeld University which were 18,458 students in 2010. 4,500 students participated in this survey with more than 25% of the total number of students. The survey raised an assumption for the students to document how would their travel pattern change if the semester ticket was not existing for one week prior to the survey. The results of this survey as shown in Figure (4), 44% of the trips conducted at this week by the samples would have been done by the same means of transportation, 22% of the trips would be conducted through different means of transportation and 28% of the trips would not be conducted. In this survey, 28% of the sample size were car owners, and 15% were former car owners and 57% are non car owners. After applying the Semesterticket, 17% of the car owners were thinking about getting rid of their cars and 44% of the non car owners decided not to buy a car because of the Semesterticket. Thus the Semesterticket was a motive for a model shift from the car usage to the public transportation usage. (Müller, 2016, p. 12)

Figure (4) The effects of the Semesterticket on the Bielefeld University students



Source: (Müller, 2016, p. 15)

The section 11a of the Public Transportation Law of the NRW which is named “School Transport Package” “Ausbildungsverkehr-Pauschal” states that the state should pay the municipalities annually a lump sum of €130 million from the state resources. This budget is dedicated to cover the claims of the municipalities regarding the transportation of the students based on the assumed passenger kilometer per student, and then these funds should be forwarded to the transportation operators in each municipality. At least 87.5% of the fund should be paid to the operators as a compensation for their costs of transporting students by different means of transportation, while up to 12.5% of the budget should be directed to finance the measures of the further development of tariff and transportation offers and improving the quality of the transportation system for the students. (Gesetz über den öffentlichen Personennahverkehr in Nordrhein-Westfalen, 2012, p.3)

Considering that the percentage of postgraduate students to the total number of school and university students in Germany is about 18% (Towards universal participation in post-16 mathematics: lessons from high-performing countries, 2013, p. 15) (Number of students in universities in Germany during winter semesters from 2002/2003 to 2018/2019), and that the lump sum of €130 million funds is dedicated to both university students and school pupils (Sustainability Bond #3, 2017, p. 8), the fund is divided to cover the Semesterticket for the university students and the SchokoTicket for the school pupils. As mentioned before, the Semesterticket covers the whole NRW, but the SchokoTicket covers only a certain region within the state (Tariff zones, regions & price levels, 2019). Estimating the fund dedicated only to the university students in the NRW should consider the percentage of the university students to the total number of the students and pupils in the state, and the standard prices of a day ticket to one of the zones of the SchokoTicket and the NRW ticket. Knowing that a standard day ticket for the NRW which is the region of the Semesterticket costs €23 (Regional Day Ticket, 2019), while the standard day ticket for Dusseldorf city which a region for the SchokoTicket

costs €5.9, so the SchokoTicket costs about 26% of the standard NRW day ticket which is 16% out of the total cost. Adding to these ratios that the percentage of the university students is only 18% out of the total number of students and pupils, it would be conducted that the percentage of the subsidy fund dedicated to the university students is about 54% of the total fund, which means €70.2 millions. By dividing this amount of subsidy by the 500,000 university students in the NRW (Müller, 2016, p. 12), the transportation subsidy per capita assigned to the university students in the NRW would be €140.4 annually. This number is calculated for a similar region to the Netherlands in the population, area and population density.

## 2.6 Social Justice

“When we talk and argue about social justice, what exactly are we talking and arguing about? Very crudely, I think, we are discussing how the good and bad things in life should be distributed among the members of a human society” (Miller, 1999, p. 1). Miller started his book “Principles of Social Justice” with these words adding that an attack is conducted against policies or states that lead or perform injustice between its members. In his definition to the good and bad things that should be distributed to achieve social justice, Miller mentioned wealth, jobs, educational opportunities and other services, and he stressed on sharing these good things among the different societal groups searching about the governmental policies that affect the equity sharing.

As a prerequisite for discussing social justice, Miller used the definition of L. T. Hobhouse for the term “society”, as he defined the society as “An organism in which the flourishing of each element requires the cooperation of all the others”, thus this organism consists of all the society members who would live in good conditions if they integrate and cooperate. Miller identified the process and the responsibilities of achieving social justice, as he mentioned that it is a responsibility of the institutions that would set the legislative and policy arrangements that allow each person to contribute and have advantage of the social justice. Miller assumed that in many societies, there are groups, agencies or institutions that have the power to affect the institutional structure to meet the favor of certain groups. (Miller, 1999, p. 4)

Applying Miller’s perspective on the students’ transportation subsidy in the Netherlands, it would be highlighted that the goods and bads are not equally distributed among the society members, as there is a benefited group which are the Dutch students who has the power (voting power) which affects the legislative and policy arrangements within the Dutch society, although the non-subsidized students are part of the society according to Miller, as they are cooperating and integrating with the society either through their different economic and social activities and academic outputs.

### 2.6.1 Justice in Transportation

“Transport good, defined as accessibility, should be distributed in a so-called separate sphere, i.e. independent from the way in which other key goods, like money or power, are

allocated” (Martens, Justice in transport as justice in accessibility: applying Walzer’s ‘Spheres of Justice’ to the transport sector, 2012, p. 1035). Although Karel Martens mentioned the adequate distribution of accessibility, but he began his words with mentioning that the accessibility is the transport good. In another words, Karel Martens highlighted that the certain levels of accessibility should be given to everyone, regardless the allocation of money and power. Applying this on the international students as a part of the Dutch community, the students might be depending on their parents' income to finance their studies and living expenses, taking out a loan may replace parental contributions, and/or working for a part-time job. It has to be highlighted that more than 70% of the students who work for part-time jobs in the Netherlands work less than 12 hours per week (Vossensteyn, 1999, p. 65). Focusing more on the international students in the Netherlands, the non EU/EEA and Switzerland citizens can work only up to 16 hours per week (Working while studying, 2019). This classifies the international students particularly as having lower levels of money and power, as they have limited financial resources, and they are not having the voting rights in the Netherlands, thus they cannot form political pressure groups on the decision makers or the political parties to enforce a rule.

Martens mentioned also that the cost benefit analysis and transportation modelling are directed by distributive principles that favour the highly mobile groups at the expense of the weaker groups in a society. The reason behind that is that the future forecast of the travel demand is a kind of reproducing the existing unbalanced transportation between the different groups of communities. Applying this method would lead to the groups having high mobility levels to stay having high mobility levels, while the groups having low mobility levels to stay having low mobility levels, regardless the essentiality of mobility and accessibility to the two groups (Martens, Basing Transport Planning on Principles of Social Justice, 2006, p. 1).

The regional transportation planning focuses on transportation performance such as passenger kilometers, total delays or total emissions. This should go in parallel with the measurements of fairness. A transportation plan would be considered as a fair plan when it achieves high accessibility levels for the population. To be more precise, introducing a “Transportation Poverty Line” to define the disadvantaged groups would allow the regional transportation planning to assure the equity indicators and assess the proposed plans (Golub & Martens, 2014, p. 18).

Having limited political power in the country in addition to their limited financial resources, the international students in the Netherlands have low mobility levels which lead to low accessibility levels and limited power to change their current situation. Since the current cost benefit analysis modelling used to develop transportation plans do not consider the distributing equity on the disadvantaged groups, introducing new transportation policies would be more useful to fill this gap, such as merging the disadvantaged group which are the international students with the benefited group which are the Dutch students to have an equal transportation subsidy scheme. This is to ensure that all the students which are a group of financial limitation as discussed, would not fall under the “Transportation poverty line”.

## 2.7 Interventions for Reaching Transportation Poverty Line Threshold

Some interventions would be proposed for those who fall under the poverty line in general, and under the “Transportation Poverty Line” in particular, as this is the focus of this research. Each of the programs targeting reducing the number of people falling under the poverty lines in different countries usually target definite poverty index because of the different constrains. One of the most essential matters in these projects is the optimal resources allocation and how they target and define the disadvantaged groups, as allowing equal linear subsidy for the different groups would be resulted in more expenses with minimal effects (Chakravarty & Mukherjee, Optimal Subsidy for The Poor, 1998, p. 313).

Allocating antipoverty subsidy would achieve more equity if the more rich the people are, the fewer subsidies they have. Also the subsidy should not affect the ranking of the poverty of the different group pre and post the subsidy; otherwise it would be disadvantaging other groups. Briefly, the subsidy would be distributed in an unequal way favoring the more poor people achieves more inequality reduction (Chakravarty & Mukherjee, Optimal Subsidy for The Poor, 1998, p. 314).

Applying the proposed methodology of allowing the poorer more subsidies to the poorer people definitely would advantage the international students in the Netherlands with transportation subsidy, as the students in general earn less compared to other groups within a community (Guvunen, Kaplan, & Song, 2014, p. 24), while the international students have lower access to the job market, as the no EU students who are part of the international students in the Netherlands are allowed certain number of working hours (Working while studying, 2019), and small percentage of them speaks Dutch, so they would be considered as poorer than the Dutch students, and one of the poor groups. Chakravarty & Mukherjee mentioned that different projects aiming to reduce poverty work on different poverty indexes, while Karel Martens as mentioned previously introduced a new poverty index, which is the “Transportation Poverty Line”. This research tests if the international students in the Netherlands fall under the transportation poverty line or not and propose giving them the same subsidy scheme the Dutch students have, so they ranking of the different groups towards poverty would not be changed, while the situation of the disadvantaged group would be enhanced. This also was agreed by transportation scholars such as John Pucher, as he stated “The distribution of the costs and benefits of government programs among income classes has been an issue of traditional interest among policy analysts. An evaluation of redistributive impact is particularly appropriate for transit programs as one of the key justifications of transit subsidization has been the premise that the poor are the primary beneficiaries” (Pucher, 2007, p. 387).

## 2.8 The international Students Are Part of the Dutch Community

Diaz defined the community by integrating different definitions for this word. He did not limit the relations and ties of community members to the natural ties built by kinship, friendship, familiarity and habits. But he included the ties resulted from living in a common

locality which would develop more ties further. Diaz underlined the argument of Ferdinand Tonnies, a German sociologist and philosopher who argues that the community is characterized by a rational will, where the advantages people expect to receive from the other community members and deliberation and evaluations of means and ends have to be subjected the governing role of the relations between people (Diaz, 2000).

Diaz referred also to the community as a conceptual term delivered from the social interaction between the individuals who share the same geographic area in general. Also generic communities would be formed within the main community based on the members' social interactions within the different groups. Also the community is characterized by the existence of the shared interests and solidarity of its members. From a holistic perspective, the community has to achieve a limit of self-sufficiency and its members or sub-groups can integrate, so "community is seen as a structure different from the sum of all its parts, possessing powers and potentialities not present in any of its components". (Diaz, 2000)

Diaz argued that there are three main elements existing in a community which are social interaction, common ties and the geographic location, while from a sociological perspective, there are two main notions of a community. The first one considers a certain community based on the types of relationships, the identity and the spirit among group of people. This means that this trend follows the ideological arguments in sociology. Diaz criticized this trend because it misses addressing the conflicts and the social stratification within a community. The second trend of defining a community is broader, as it defines a community based on sharing the same geographic location that has a local social system and set of social relations. (Diaz, 2000)

Based on Diaz, since the international students in the Netherlands live on the same territory with the Dutch citizens, governed by the same rules and regulations and achieving a level of interaction with the other community members, they are part of the community of the Netherlands although they do not have the Dutch citizenship. The international students also contribute to the community to achieve the sufficiency limit Diaz mentioned, as they fill some of the student jobs, and contribute to the academic input in the whole country in addition to participating in the different markets.



### **3. Methodology**

#### 3.1 Research Strategy

##### 3.1.1 Ontological and Epistemological Consideration

Subsidizing the transportation of group of the students in the Netherlands, while not allow other students to have the same kind of subsidies creates an inequity between those two groups which limits the choices of activities for the nonsubsidized group. This research investigates the current and the future usage of public transportation for the non-subsidized students to calculate the cost of applying this equity.

To proceed with this, the research follows the positivism paradigm which stands in a position that advocates for the application of the methods of the natural sciences to the study of social reality and beyond (Bryman, 2015, p. 27). As this research discusses the subsidy scheme of the university students which results in the current usage/ phenomena, compares it with the future increase of the public transportation usages if the equity between university students were applied which is a social reality related to the link between the prices and the consumption and this study takes place through applying quantitative methods on number of samples of the university students which is methods of natural sciences, so this research applies the positivism paradigm.

This research applies the principles of positivism which states that phenomena and hence knowledge confirmed by the senses can genuinely be warranted as knowledge, the aim of a theory is generating hypothesis that could be tested and knowledge is obtained by gathering of facts providing the laws basis (Bryman, 2015, p. 28). The research goes in line with these principles, as it deals with the output of a quantitative survey to measure the phenomena of increasing the number of passengers/ passengers' kilometers, and then the hypothesis of increasing the operational cost of the public transportation would be measured and assessed by calculating the differences in operational cost.

Applying the objectivism epistemology on this research allows the research to deal with social phenomena which exists regarding the social or the academic influences (Bryman, 2015, p. 32). Through the different phases of the research, the quantitative primary data would be gathered using random sample of disadvantaged university students through which the researcher would be only dealing with numbers of students, percentages of usage increase, number of kilometers and then calculate the increase in the operational cost of the public transportation through a systematic approach, so the researcher would not be able to influence or guide this number, but he would only follow the academic approach to reach the result that would present a social fact.

### 3.1.2 Research Design

This research follows quantitative data collection methods applying that on two levels. Firstly, by questioning a sample of the non-subsidized students through qualitative surveys and interviews to determine their need to this subsidy and how it would affect their travel pattern through defining their current and future usage of the public transportation. Then measure the direct financial effect that would be deducted from the revenue of the transportation operators through the decreased sold tickets, and future usage of the students of public transportation if they were subsidized to determine the increase in the operational cost. To conduct this, a deductive approach would be applied, as it would not lead the researcher to draft a new theory, but to confirm an existing one through coming up with hypothesis, which is the increasing number of passengers if the new subsidy was set and change would happen to the operational cost and the operational plan, then the data collection from through a sample of the beneficiaries through which the results would come out to confirm or reject the theory and raising definite numbers of the increased numbers of users and costs (Bryman, 2015, p. 24) (van Goeverden, Rietveld, Koelemeijer, & Peeters, 2006, p. 10).

Based on the outcome of the primary data collection and the calculations of the increased subsidy of the public transportation, the expected cost of subsidizing the transportation of the non-subsidized students will be determined and the expected increase of the operational cost would be determined. That allows the researcher to propose actions and/or changes in policies to achieve the social equality and equity between the different groups of students.

## 3.2 Research Methods

### 3.2.1 Survey

To answer the first research questions including its two sub questions, this research collected the respondents of the international non-subsidized students on a quantitative survey. The surveys in general are considered to be a prevalent research method to collect data, and they would be conducted by phone, face to face or by post for example (Bryman, 2015, p. 232). Compared to a focus group, the survey has different advantages, as it has a less cost and it is easy to organize beside the ability to collect large number of samples in a short time, especially the web surveys that offers more flexibility in the format and design which would attract more respondents (May, 2011, p. 119). Beside these advantages, the validity of a survey is questioned, as the results would only reflect the perspective of the sample only, not the collective perspective of the sample population, this highlights the importance of the selection of the samples invited to participate in a survey (Bryman, 2015, p. 48).

This research used an online survey to facilitate contacting a variable samples from different locations in the Netherlands. The survey is divided into four sections; the first one contains general demographic information such as the country of origin, age, gender and

income. The second section collects data about the average cost and frequency of the current usage of the sample to the public transportation in the Netherlands in the weekend days and in and outside the rush hours, as this would be an input to calculate part of the loss of budget through the purchased tickets by students. The third part is designed to clarify the future usages of the samples regarding the public transportation during their stay in the Netherlands if they were having an equal subsidy scheme to the Dutch students. This section will identify specifically the destinations and the frequencies of the forecasted trips to be able to calculate the added passengers' kilometers to the Dutch public transportation system.

### 3.2.1.1 Sample Size Determination

Determining the sample size depends on different considerations. The number of the targeted population is not the most important factor for determining a sample size, as the confidence level can affect the required sample size more, as large number of samples cannot assure precision if the confidence level is low, so moving from random sample to a sample which targets a specific population increased the level of confidence and as a result decreases the required sample size. Another important aspect to be considered is the sampling error, as it decreases when the sample size increases, so the acceptable percentage of the sample error should also be determined. (Bryman, 2015, p. 198)

For this research, the population size which is the number of international students in the Netherlands is 122,000 (Key figures, 2018). This required a sample size of 270 samples after determining a 5% of acceptable margin of error, 90% of required confidence level and 50% of response distribution, and based on the following equations:

- $X = Z(c/100)^2 r(100-r)$
- $n = N x / ((N-1)E^2 + x)$
- $E = \text{Sqrt} [(N - n)x / n(N-1)]$

Where N is the population size, which is number of international students in this research

Z(c/100) is the critical value for the confidence level c

r is the fraction of responses

E is the margin of error

N is the number of samples (Sample Size Calculator by Raosoft, Inc.)

### 3.2.1.2 Distribution Method

This research used an online web survey tool which is “Google Document Survey” to build the sample. The web survey operates by inviting the determined sample to visit a website where they can answer the online questionnaire (Bryman, 2015, p. 671). The online survey options can boost the rate of response to the questionnaires, as it requires limited resources compared to other types of surveys, as it does not need to use papers, envelopes and also it consumes less time in preparations. Also the online surveys in general have more quickly

responses than other forms of surveys such as the postal survey. The attractive formats in addition encourage the respondents to be more enthusiastic about filling the survey, especially if they can see the results of the survey at the end. Another advantage of an online survey is not having geographical restrictions, as samples in different locations can participate at the same time and it achieves, fewer unanswered questions which lead to less missing data, better responses to open questions, as they are answered online in more details and they achieve better data accuracy, as data entry is automated, so the researcher is not required to enter data manually on a spreadsheet (Bryman, 2015, p. 677).

To assure the validity of the gathered data, the research depended on samples distributed on the different locations in the Netherlands. The online survey allowed this research to reach out different international students in different Dutch cities and studying in different universities in a short period of time through posting the survey link to different groups of international students on the social media.

### 3.2.1.3 Survey Analysis

The survey aims to identify ordinal variable, as the distance to measure the central tendency of the international students after changing a variable which is the subsidy scheme. This is conducted through getting the arithmetic mean of the answers of the samples which is the average that can be calculated through dividing the sum of the values of the samples answers by the number of the samples (Bryman, 2015, p. 339). Calculating these averages guided the research to predict the future usage of the students if they were subsidized by multiplying the averages by the total number of international students.

### 3.2.1.4 Reflections on Samples

The aim of this survey is to calculate the current usage and the proposed usage of the international students if they were subsidized. Since the passenger kilometers is defined as “The measurement unit describing the passenger carrying performance of some means of transport such as a passenger car, coach, train, boat, aircraft or any transport vehicle suited for the transporting of passengers” (Passenger-kilometre, 2019), and it is the unit used in the Dutch transportation reports (NS Annual Report 2016, 2017), (NS Annual Report 2017, 2018) and (NS Annual Report 2017, 2018), the output reflecting on the usage of the international students in this research used the passenger kilometer the measuring unit for the transportation usage.

As the passenger kilometer unit is used by the officials, transportation planners, operators or the related ones to the transportation planning or mobility fields, the students not related to these majors were not expected to give accurate responses if they were asked about their passenger kilometer usage. To avoid this, the survey was designed to ask the students about their average current monthly and future expenditures if the students were subsidized for each mean of transportation. To convert the expenditures to passenger kilometers, the samples

were divided into groups according to their current monthly public transportation subscriptions to be able to aggregate the total amount of expenses with determining the percentage of discount allowed to each group; this allowed the researcher to calculate the total amount paid by students for the same trips if they were not subsidized. The next step was to calculate the average cost per trip in the Netherlands using the average kilometer fare of the different operators multiplied by 32.9 which is the average trip distance using public transportation in the Netherlands (Boarding fare and basic fare, 2019), then adding the result to 0.96 which is the national basic fare of public transportation, as the passenger has to pay this fee additional to the kilometer fare (Boarding fare and basic fare, 2019). The following step was to divide the total expenditures by the average cost of the average to know the average number of trips covered by the samples. By multiplying the number of trips by the average trip distance, the current and the proposed passenger kilometers were calculated, and by multiplying the average usage per sample by the number of international students in the Netherlands, the current usage of the international students, the expected usage after subsidizing the students and the effect of the change of usage of the international students on the public transportation in the Netherlands was calculated.

### 3.2.2 Document Analysis

The official documents form a great source of information, as it produces significant statistics, so it is a main source of secondary quantitative data. An important advantage for the state documents as a type of the official documents is being authentic is state documents have clear comprehensive information produced by an official actor. Although the state documents would be biased because they might be reflecting the governmental perspective, and this might affect their credibility, and the way the information presented could have an effect on the reader, so the caution is important when dealing with this kind of official documents (Bryman, 2015, p. 550). Other type of the official documents is the official documents derived from non-state actors whether these actors were public domain actors or not, such as company documents, research institutes or universities. (Bryman, 2015, p. 550)

In this research, the document analysis depends on analysing official documents produced by state and non-state actors. The role of the documents analysis in this research comes after the survey, as the output of the survey was the information about the increased number of passenger kilometer, while the document analysis will provide the researcher with the required information about the cost per kilometer per each mean of public transportation. This allowed the researcher to combine the output of the primary data obtained from the survey and the secondary data obtained from the document analysis to get the final answer to one of the research question about the cost of the added number of passenger kilometer resulting from allowing the international students the same subsidy scheme the Dutch students have in the Netherlands.

### 3.2.3 Key Informant Interviews

The role of a key informant interview is to make use of the experience and the knowledge of a key informant person to assess the predictive validity. They can add their input either to assess the baseline situation, or to introduce new views considering different aspects. Although the research inputs and outputs can reach or assure a certain level of information, but the key informant's role is particularly important to the research as their eyes can easily see the social reality in between the different theories. A key informant can also provide the researcher with specific information regarding a definite issue that that the researcher is not able to reach through his direct observation or by other means. (Bryman, 2015, p. 440)

This research used the input of the academic key informant to reach the consequent step to answer two of the research questions. After determining the number of increased passenger kilometer to the Dutch public transportation network that would be conducted by the international students in the Netherlands if they were allowed the same subsidy scheme of the Dutch students through the survey, the key informant interviews takes place for using the academic background and experience of the key informant to provide the researcher with the required data prediction about the size of the change of the operation of each public transportation mean and the expected cost for this change. Adding this cost of change to the cost of the increased passenger kilometer allowed the researcher to get the overall cost of the equity in transportation subsidy between university students in the Netherlands which is one of the main research questions.

### 3.2.4 Data Verification

Out of the gathered samples, non-reasonable samples excluded out of the calculations. Two types of exclusions were set for the non-real overestimating and underestimating samples. The baseline of exclusion for the overestimating usage samples was set to be exceeding a daily average of passenger kilometers more than the two ways trips between Winschoten in Groningen and Sluis in Zeeland during the days covered by the aimed type of transportation pass, either the weekday pass or the weekend pass, as the trip between these towns represents the longest trip between the farthest two towns in the Netherlands. The one way trip between Winschoten and Sluis is about 420 km and it takes around 7 hours (Netherlands, 2019) (Departure from Sluis to station Winschoten, 2019), so the two ways trip would be 840 km. To get the final threshold of exclusion, this number is multiplied by the 22 working days for the weekday pass and by 8 days for the weekend pass. As a result, the threshold is excluding any sample of proposed average passenger kilometers exceeding 18,400 passenger kilometers per month for the students who chose the weekday pass, and 6720 passenger kilometer per month for the students who chose the weekend pass. On the other hand, the threshold of the exclusion of the underestimating samples was conducting number of passenger kilometers after receiving the subsidy less that their current usage.

For verifying the outcome accumulated from the non-excluded samples, the total increase in the passenger kilometers for the international students after receiving the subsidy was assessed related to two benchmarks. The first one is the argument of Litman which states that the usage of public transportation would increase by 40% if it was totally subsidized (Litman, *Evaluating Public Transit Benefits and Costs: Best Practices Guidebook*, 2018, p. 18). Although Litman raised this percentage, but he mentioned also that this percentage varies based on the different geographic, demographic and service factors. To get closer to the accurate increase of the usage, the other benchmark is used. This benchmark is the percentage of increase of the usage of the Dutch students to the public transportation when they were allowed the freely travel in 1991, as their average daily trips increased by 80%. In conclusion, if the proposed average percentage of increasing the usage of the international students to the public transportation in the Netherlands achieved related percentages, this would be considered as verification for the outcomes. It would be also compared to the project took place in 2004 which was providing free bus transportation between Leiden and Den Hague, as comparing the added occupancy rates to other documented Dutch cases would give more validation to the outcomes of this research regarding the tendencies of the students to travel during the different timings which are the peak hours, non peak hours and weekends. The results of the survey would be verified through comparing them to documented increased usage of applying the German semester ticket on the NRW. The two results are comparable because the students share some of their demographic characteristics, so their behavioral changes due to applying the same new policy would be similar, and the surface areas and the population of the Netherlands and NRW are similar also (Facts & Figures, 2014) (Nordrhein-Westfalen, 2011).

### 3.3 Frameworks

#### 3.3.1 Theoretical framework

The theoretical framework is delivered from the notions of Litman for the transportation equity, as he divided the transportation equity into two types as shown in Table (2). The first one is the horizontal equity and it is more general, as it promotes for the distribution of impacts between the different groups and individuals without favouring a certain group, while the vertical equity goes into more details, as it considers the distribution of impacts on the different groups, these differences might be social, economic or any other disadvantaged groups. Both types of equity are not achieved in the transportation subsidy offered to the students in the Netherlands which this research is promoting to achieve (Litman, *Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning*, 2018, pp. 2, 3).

The different compared groups are categorized based on their demographics such as nationality and type of residency to achieve the horizontal equity between students and to their income class, as the non-subsidized group is part of the students in the country who have one of the least incomes. Achieving the mentioned types of equalities would affect firstly the

enforced regulations, as they would be changed to include a different group. It would impact also the subsidized groups as individuals, as they would have more accessibility, and they would save the money they already use to buy tickets, but it would have other impacts on the public facilities that would deal with more number of passengers, so they might need redesign for the offered and might require additional budget. Achieving the proposed equity would be measured by the number of advantaged persons, per the number of increased trips or by the additional cost resulting from it.

Table (2) Theoretical framework

Type of equity	Categorization	Impacts	Measurements
<ul style="list-style-type: none"> <li>• Horizontal equity (Equal treatment of equals)</li> <li>• Vertical equity (consideration of need and ability)</li> </ul>	<ul style="list-style-type: none"> <li>• Demographics               <ul style="list-style-type: none"> <li>- Nationality</li> <li>- Type of residency</li> </ul> </li> <li>• Income class</li> </ul>	<ul style="list-style-type: none"> <li>• Public facilities and services               <ul style="list-style-type: none"> <li>- Facility planning and design</li> <li>- Public funding and subsidy</li> </ul> </li> <li>• User costs and benefits               <ul style="list-style-type: none"> <li>- Mobility and accessibility</li> <li>- Taxes, fees and fares</li> </ul> </li> <li>• Regulation and enforcement</li> </ul>	<ul style="list-style-type: none"> <li>• Per capita</li> <li>• Per trip</li> <li>• Per Euros</li> </ul>

Derived from (Litman, Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning, 2018, p. 10)

### 3.3.2 Conceptual framework

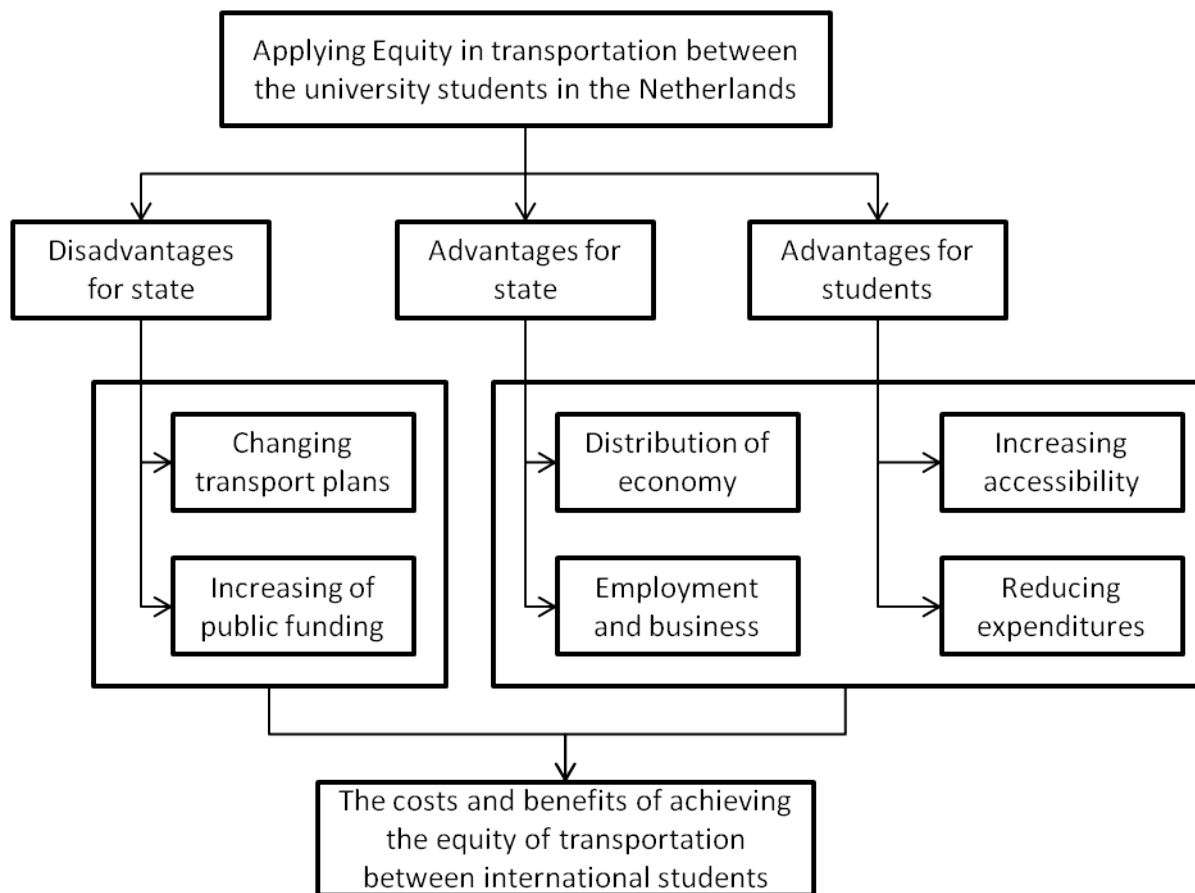
The conceptual framework of this research focuses on the advantages and disadvantages resulting from achieving the equity of transportation between the different groups of students. Those advantages and disadvantages are divided into three groups, the first one is the direct disadvantages of the state, as the transportation plans would be changed and the public funding directed to the public transportation would be increased to overcome the increasing number of passengers, on the other hand, the state would be advantaged from the distribution of the economic activities of the disadvantaged group if they were subsidized, additional to their accessibility to the different job opportunities that would be increased. For the advantaged students from applying this equity, they will be directly advantaged from increasing the accessibility to the different activities and the reduced expenditures that they would save. Adding to the mentioned advantages and disadvantages, only achieving the equity between the different groups of a community is a goal regardless any side effects.

The conceptual framework is designed based on a hypothesis which assumes achieving the equity in public transportation between the Dutch and the international students in the



Netherlands. Since the Dutch students have transportation subsidy (OV-chipkaart - Travel with the student travel product, 2019), allowing the international students the same subsidy scheme would disadvantage the transportation system through adding more passenger kilometers, which would lead to an increase of the public expenditures to overcome the added usage (Litman, Evaluating Public Transit Benefits and Costs: Best Practices Guidebook, 2018, p. 13). On the other hand, but it would increase the accessibility of the international students to the different services and fill the gap of the transportation needs for one of the disadvantaged groups (Martens, Basing Transport Planning on Principles of Social Justice, 2006, p. 10).

Figure (5) Conceptual Framework



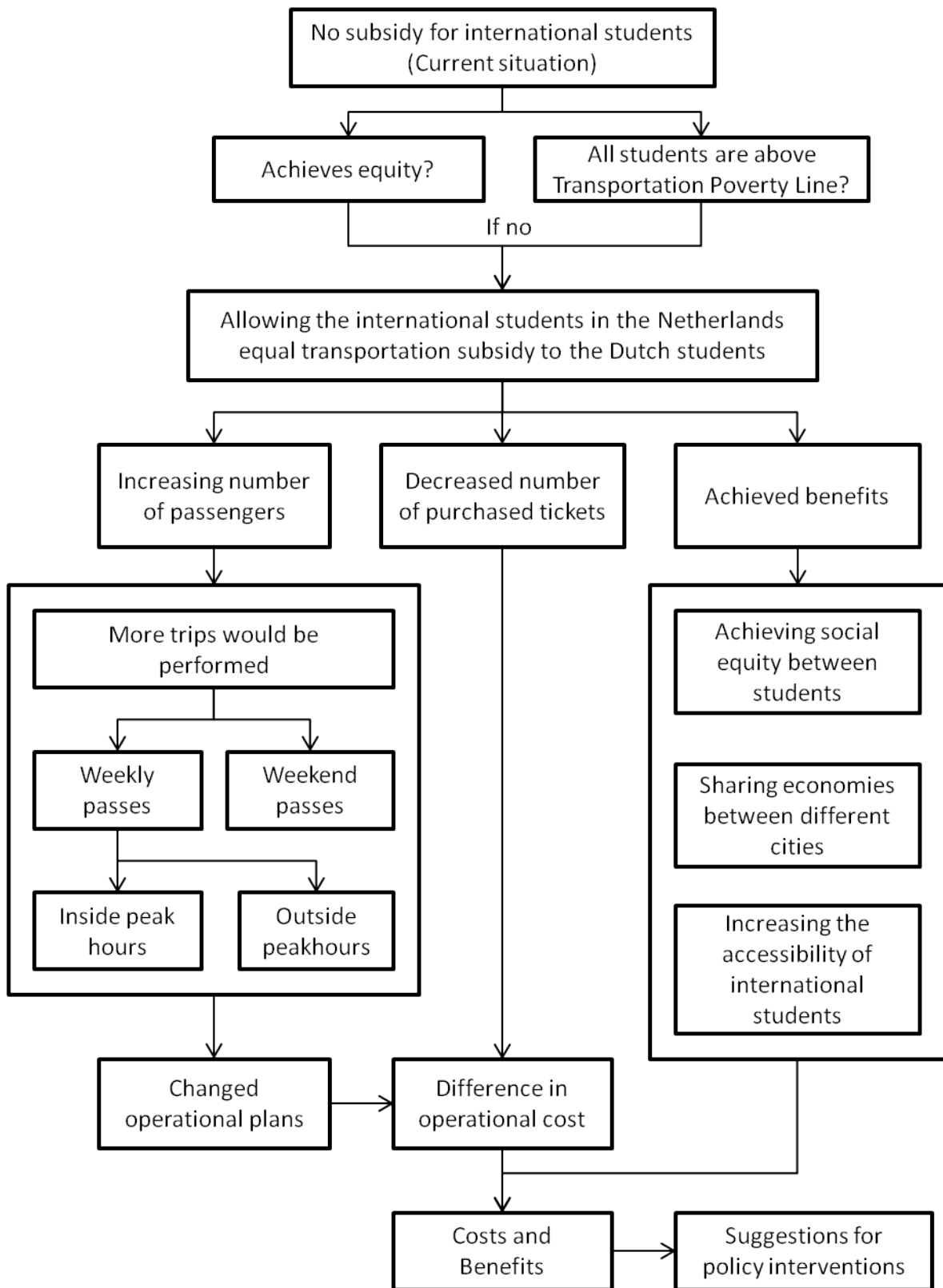
### 3.3.3 Analytical Framework

The analytical framework as shown in Figure (6) starts with discussing the baseline transportation situation of the international students in the Netherlands regarding the needs and affordability. This leads the research to discuss if this situation achieves the equity between the different groups and ensures that the international students are above the "Transportation Poverty Line" or not to take actions tackling this gap, which are mainly allowing the same subsidy scheme to the different groups of students.

The consequences of achieving the equity between the different groups of students in the Netherlands, this equity would be achieved by allowing the international students in the Netherlands the same subsidy scheme the Dutch students have. This would have direct consequences on the income of the public transportation operators, as the students would not pay the same amounts for buying the tickets and having the transportation subscriptions as they do currently. Also if the occupancy rate of any of the public transportation means exceeds the limit of 100%, the operational costs of the public transportation would increase, as more vehicles or trains would be needed to cover the added usage and this would result in more additional costs. (Peak Occupancy Rate, 2014). This research analyses the current usage of the international students to the public transportation to know their current expenditures that they will save if they were subsidized, and this is the exact amount that the public transportation operators will lose if the international students were subsidized. Also the research compares the proposed added usage of the public transportation if the international students were subsidized, and compare it to the current occupancy rates of the public transportation means in the Netherlands to check if the occupancy rates would exceed the limit of the 100%, then another round of calculations would be added to determine the additional operational costs. The processes of calculating the current usage of the public transportation and the proposed one were done for each public transportation mean during the peak hours, non-peak hours and weekends –with respect to the available data- to be able to get more accurate and separate results.

The research refers to the benefits of the international students out of having subsidized public transportation through the survey, as they were asked about their limitation of accessibility to the different activities. The answers of this question reflect the potential benefits of the students from having the subsidized public transportation, and the potential benefits of the state and the market were derived from it also as each of these benefits could be reflected on the different actors. Comparing the potential benefits to the costs of applying this subsidy, allowed the research to propose policy interventions to enhance the current situation.

Figure (6) Analytical Framework



### 3.4 Ethical Considerations

According to Bryman, using an input resulting from an online community should recognize the acceptable behaviours through data protection and legislation. The researcher also has to inform the privacy levels he uses for the samples data. Bryman also stated when the used information tend to be more public, the researcher is less obliged to protect the anonymity and confidentiality of the individuals, or ask for their consent to use the available information (Bryman, 2015, p. 680).

This research discusses the current behaviour of a group of people which is the international students in the Netherlands in this research and compares it to the change of behaviour if another variable was changed which is the subsidy. To conduct these tasks, a survey of 270 samples was conducted, where a link for the online survey was posted to different international students groups on social media platforms. A short description for the research and accompanied the posted link, so the samples were aware of the purpose of the survey and how the data would be used. Also regarding their current and future usage of public transportation which are technical questions, the samples were asked only two questions related to demography which are their countries of origins and the cities they live in, so their names, sex or any other personal data is not known even by the researcher because the online tool used by the researcher does not allow the researcher to know/ follow even the emails used to fill out this survey. For the public data on the internet used in this research, they were cited according to the available data.

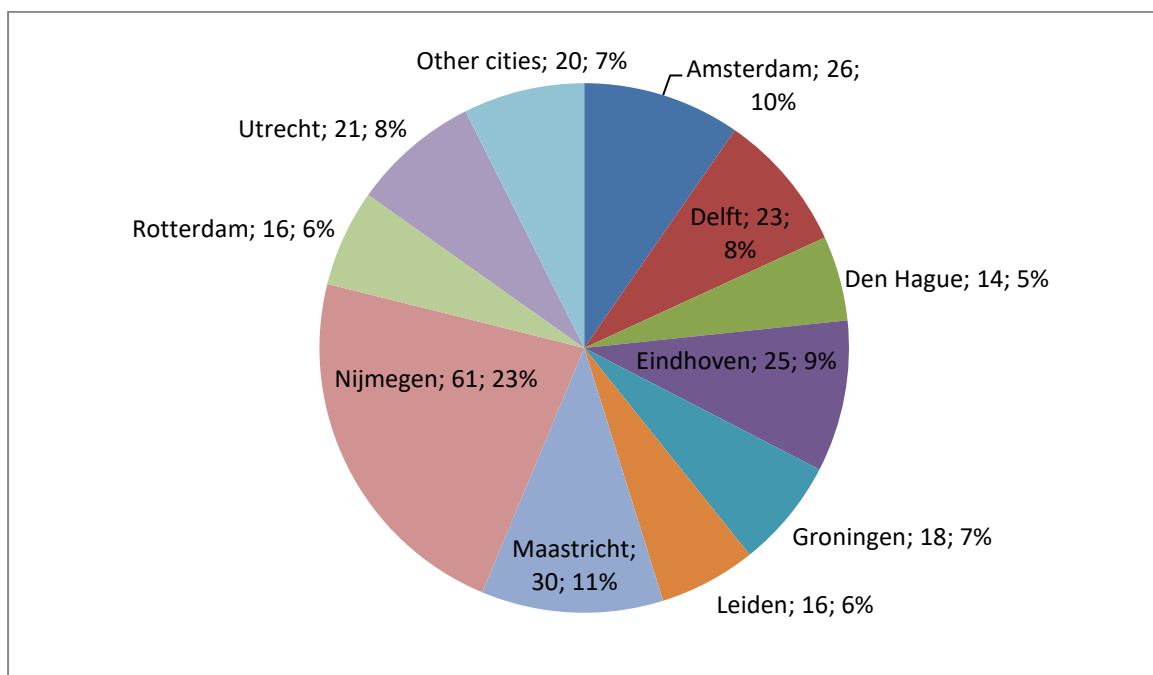
## 4. Results and Findings

This chapter discusses the results and findings coming out of the survey and to elaborate the financial effects on the state if the international students in the Netherlands were allowed the same transportation subsidy scheme of the Dutch students. This conclusion was reached based on three phases; the first one was conducting a survey asking the international students about their current usage of the public transportation and their future use if they were allowed the same subsidy scheme the Dutch students have in terms of expenditures. The second phase was doing calculations out of the survey results to convert the expenditures of students and their future usage to passenger kilometers to be able to relate the output to the general usage of public transportation across the entire country, and to obtain the percentage of increased passenger kilometers to the public transportation network. The third phase was asking key informant about the cost of adding the increased passenger kilometers to the public transportation network to validate the final outcomes.

### 4.1 Survey Results

The survey sample was built through posting links for the online survey on different international students groups in different Dutch cities on the social media websites. The respondents were not equally distributed among the different cities or according to the student population in each city, although there were a variety of cities that can represent the different tendencies of students to travel more if they got the same subsidy scheme the Dutch students have. The respondents are distributed among the different cities as shown in Figure (7).

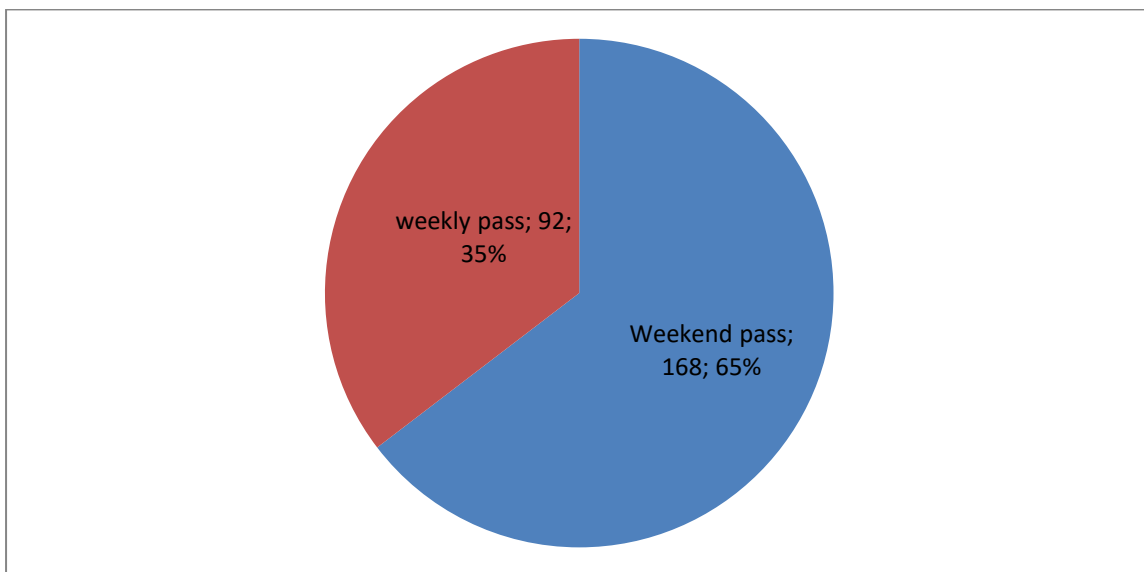
Figure (7) Distribution of survey samples among cities



Out of the 270 conducted samples, 10 samples were excluded from the calculations because of their miss-estimation for their proposed transportation usage after having the proposed subsidy. The calculations of 7 of these excluded samples showed that their usage of the public transportation would decrease if they had free weekday or weekend passes, so they were underestimating their future usage. On the other hand, the other 3 excluded samples overestimated their usage, as the calculations showed that they would conduct a monthly average of 7231, 9496, and 31273 passenger kilometers if they had weekend passes. As mentioned in 3.2.4, these passenger kilometers cover more than 8 two ways trips on the weekends, so they can form daily trips on the weekends all over the month between the farthest two towns on the east and the west of the Netherlands which are Winschoten and Sluis, as the distance between them is only 420 passenger kilometer (Netherlands, 2019).

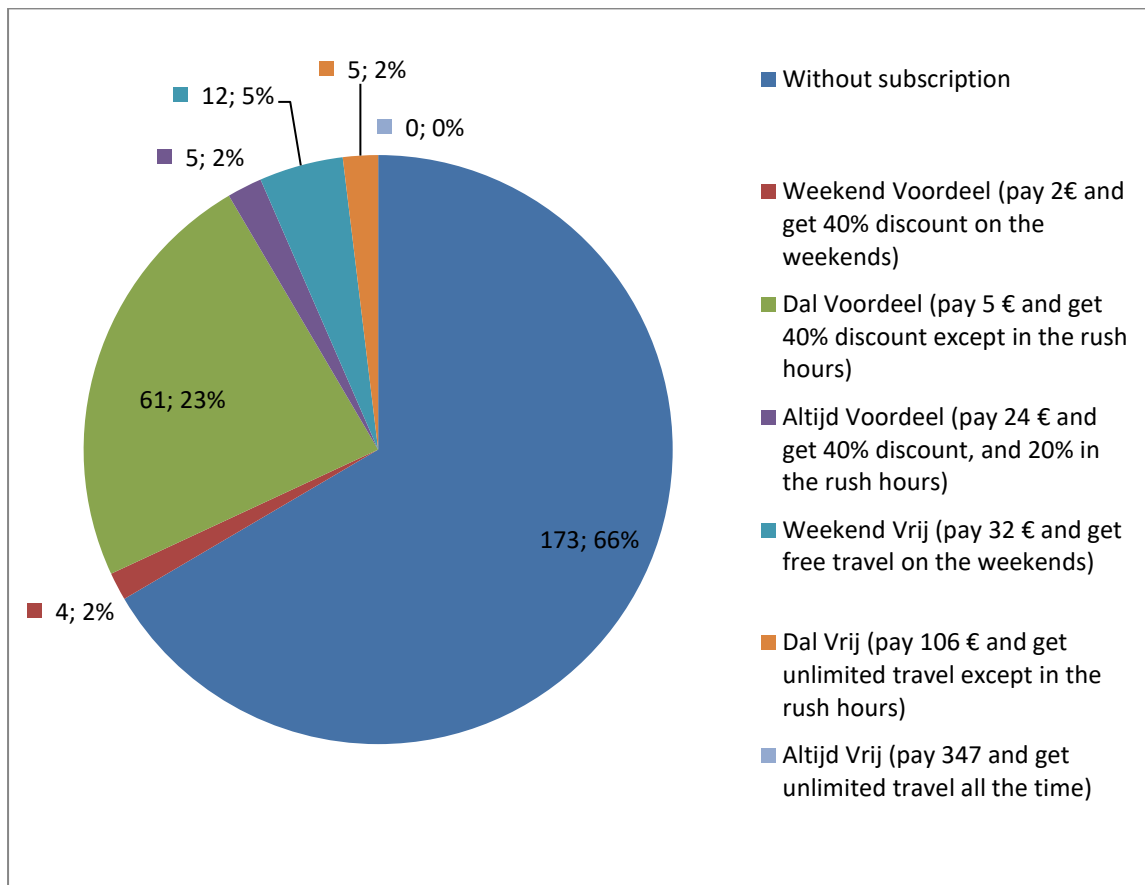
For the other 260 valid samples, the samples were tending more towards having weekend passes than the weekday passes, as 167 students which form around two thirds of the samples chose the free weekend transportation option as shown in Figure (8) while only 92 students choose to have the weekday pass.

Figure (8) Percentage of aimed weekday and weekend passes



The samples showed that most of the students do not have any public transportation subscriptions. Most of the subscriptions the students have are Dal Voordeel subscriptions that cost €5 monthly, and allow the user to have 40% of discount all the time except for the peak hours. On the other hand, none of the samples uses the Altijd Vrij subscriptions that cost €347 monthly to allow the user to travel for free the whole month. The distribution of the samples among the different types of public transportation subscriptions is presented in Figure (9). For the group tickets, 164 samples (63%) mentioned that they do not use group tickets for their transportation, while the other 96 samples (37%) depends on group tickets in some of their trips. (Products, 2019)

Figure (9) The public transportation subscriptions of the international students in the Netherlands



Out of the valid samples, 13.7% which are 37 students did not feel the unequal treatment between the international students and the Dutch students regarding the difference in transportation subsidy scheme, as the Dutch students are allowed more benefits. All the justifications for not having that feeling mentioned either that the Dutch students or their parents pay or will pay taxes later or the country has to favor its citizens. On the other hand, 86.3% of valid the samples which are 233 students felt the unequal treatment between them and the Dutch students. The students mentioned that they have this feeling because they pay for a service that other students have for free, some of them mentioned that they pay the same fee and get less benefits while some of the non EU/EEA students others mentioned that they pay more tuition fees to get even less benefits, while 4 students described this feeling as being discriminated based on their origins.

94 students who form 34.8% out of the valid samples mentioned that the cost of transportation did not prevent them from attending any event, although 13 out of them mentioned that the cost of transportation affect their budget or they have to prioritize their trips, while 6 out of them mentioned that they depend on their private cars rather than the public transportation. On the other hand, 176 out of the valid samples who form 65.2% agreed that the cost of transportation prevented them from performing certain trips. 20.4% formed by 55 samples mentioned that the transportation expenses affected their social life, as they were not able to meet friends in other cities, go to museums, attend recreational events like the King's

day or traveling through the country to discover other places, while 9.3% out of the respondents formed by 25 students mentioned that these costs limited their academic or professional life, as they were not able to attend some classes, apply for internships, student jobs or attending conferences.

These primary results show that the international students would participate more in the social life in the Netherlands, contribute in sharing the economy between the cities that contain universities and the small cities that do not have ones. Having subsidized public transportation would not only benefit the students by increasing their accessibility, but it would also increase the accessibilities of the Dutch institutions to hire international students either for part-time jobs, internships and student jobs. As 65.2% of the valid samples feel that the cost of transportation prevented them from participating in different activities, allowing them subsidized transportation would let them participate in different activities, social life or recreational activities far from their places. In addition to that, part of this percentage mentioned that the cost of transportation let them to miss some of their classes, this means that they were living far from their universities or their academic institutions. In conclusion to that, allowing the international students in the Netherlands subsidized transportation would contribute to enriching the social life, distribution of economy, sharing the supply and demand of the housing market between the different cities and increase the outreach of the recreational activities.

#### 4.1.1 The Current International Students' Expenditures on Public Transportation

The change of the revenue of the public transportation in the Netherlands would be affected by two factors if the international students were allowed the same subsidy scheme the Dutch students have. The first one is the revenues of tickets purchased by students, including the group tickets, while the second one would be the change in the transportation subscriptions the students have currently. The following calculations show the results of the 260 conducted valid samples and their projection on the total usage of the 122,000 international students in the Netherlands (Netherlands attracts record number of international students, 2018).

65% out of the samples chose to have the weekend passes. Their current monthly expenditures on the public transportation during the weekends were €5,196 for the normal tickets which are the non-group tickets, their total expenditures on the group tickets on the weekends were €1,500 and the total of the subscriptions they paid was €420. This means that their total monthly expenses on the public transportation during the weekends were €7,116. On the other hand, 35% out of the samples chose to have the weekday passes and their current monthly expenditures on the public transportation during the weekdays were €3,910 for normal tickets, their total expenditures on the group tickets during the weekdays tickets were €648 and the total of the subscriptions they paid was €928. This means that their total monthly expenses on the public transportation during the weekdays were €5,486. The average and the total usage per student during the coverage of desired passes are shown in Table (3).



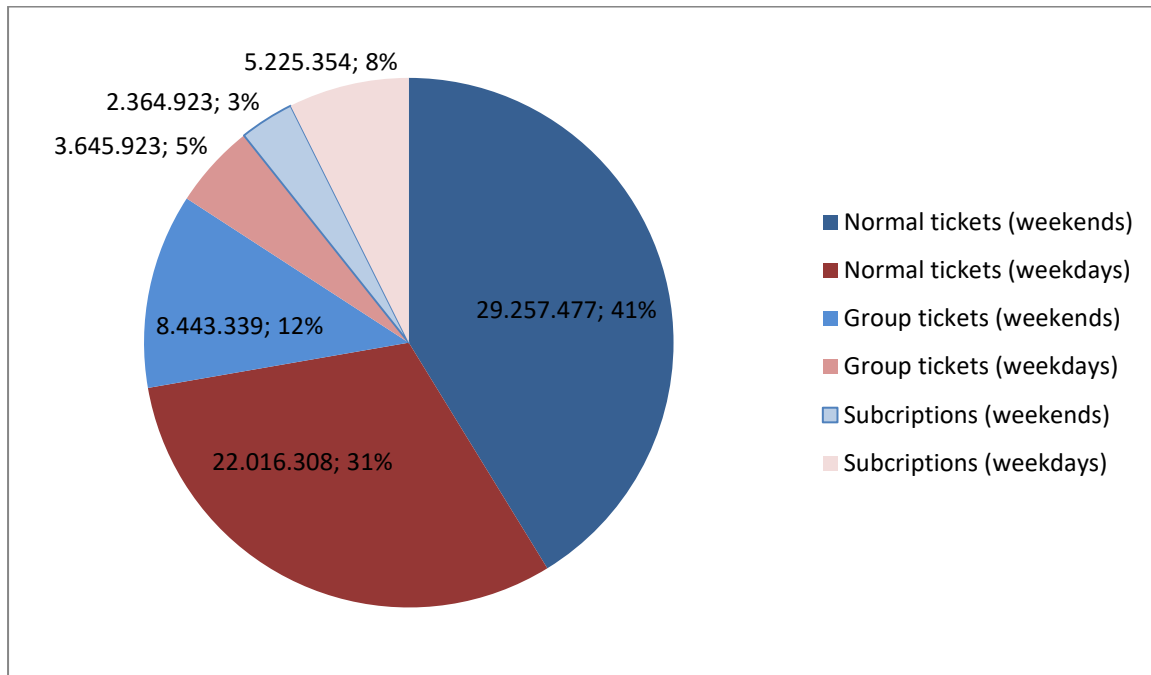
Table (3) Current monthly expenditure per student during their desire passes

	Students preferred weekdays passes		Students preferred weekend passes		Total	
	Average usage per student	Total usage	Average usage per student	Total usage	Average usage per student	Total usage
Number of samples	92		168		260	
Average expenditures on normal tickets	42.5	3,910	30.9	5,196	35	9,106
Average expenditures on group tickets	7	648	8.9	1,500	8.3	2,148
Average expenditures on subscriptions	10.1	928	2.5	420	5.2	1,348
Total	59.6	5,486	42.4	7,116	48.5	12,602

By projecting the expenditures of the students who chose to have weekend passes to the total number of international students in the Netherlands, the total monthly expenditures of the international students who would prefer having weekend passes on the public transportation on the weekends would be €2,438,123 on normal tickets, €703,612 on group tickets and €197,077 on the subscriptions monthly, and €29,257,477, €8,443,339 and €2,364,923 on each item respectively annually with a total of €40,065,738 annually. For same projections for the students who chose to have weekday passes show that the total monthly expenditures of the international students who would prefer having weekday passes on the public transportation on the weekdays would be €1,834,692 on the normal tickets, €303,827 on the group tickets and €435,446 on the subscriptions monthly, and €22,016,308, €3,645,923 and €5,225,354 on each item respectively annually with a total of €38,887,585 annually.

The total annual expenditures of the international students in the Netherlands on public transportation would be **€70,953,323**, divided into €51,273,758 paid for purchasing normal tickets, €12,089,262 paid for group tickets and €7,590,277 paid for transportation subscriptions. This would be the change in revenue of the public transportation if all the international students were subsidized in case they did not have any additional subscription outside the coverage duration of their desired passes. Figure (10) presents the amounts and the percentages of expenditures of the international students in the Netherlands on public transportation based on their aimed passes, and divided on the different types of expenditures.

Figure (10) The expenditures of the international students on public transportation

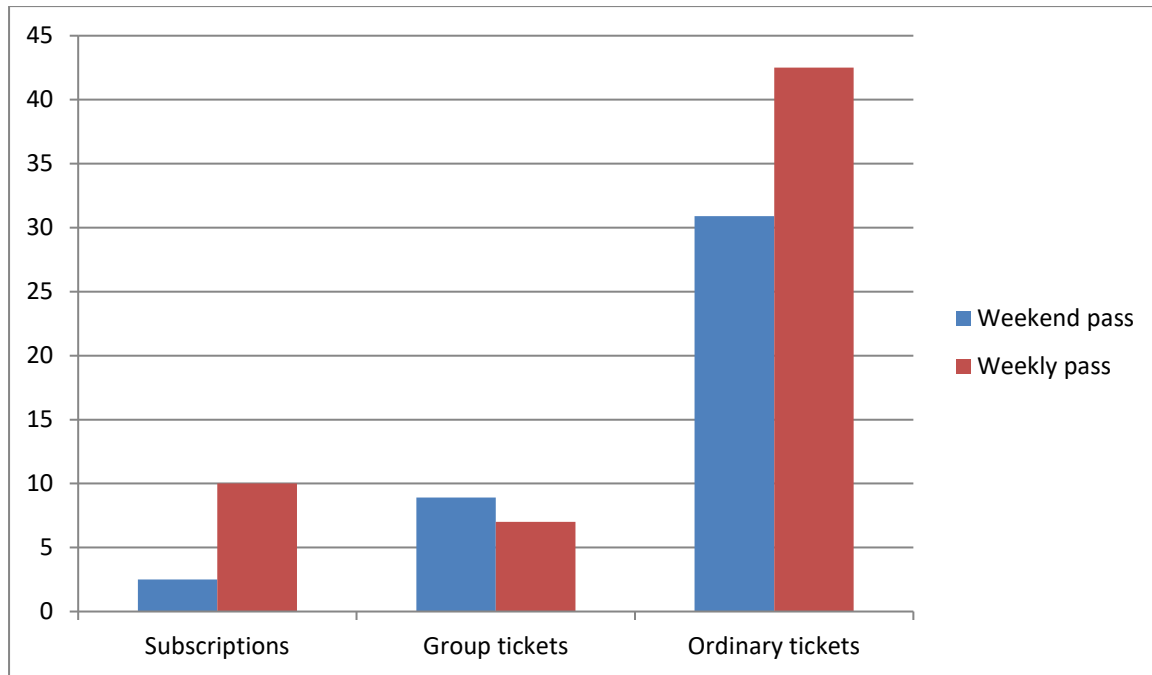


Although 65% out of the samples choose to have weekend passes, their overall expenditures on the public transportation formed only 56% out of the total expenditures of the international student on the public transportation during the coverage of their aimed transportation passes. This means that the students who chose to have the weekday passes travel more because their percentage is only 35%, while their expenditures form 43% out of the total expenditures. The two groups have almost similar ratios for expenditures on buying normal tickets out of their total expenditures, as the percentage is 71% for those who chose to have weekday passes and 73% for those who want to have weekend passes, but percentages of expenditures on the group tickets and subscriptions are different. For the students who chose to have weekday passes, they spend 17% of their public transportation expenditures on the transportation subscriptions which is around three times the other group, and they spend 12% only on group tickets. On the other hands, the current expenditures of the students who chose to have weekend tickets show that they depend on the group tickets more than the other group, as they spend on them 21% which is around twice the other group, while they spend only 6% on the public transportation subscriptions.

The public transportation expenditures per capita during the coverage of the aimed passes clarifies more the differences in the expenditures pattern for each of the two groups regardless the number of the students who chose any of the two options. The average expenditures of an international student who aim for a weekday pass on the weekdays was €59.6 monthly, €42.5 out of them dedicated for purchasing normal tickets, €7 for group tickets

and €10 for the transportation subscriptions. On the other hand, for the students who aimed for weekend passes, their average monthly expenditure on public transportation per capita was only €42.4 monthly, €30.9 out of them dedicated for purchasing normal tickets, €8.9 for the group tickets and only €2.5 for transportation subscriptions as shown in Figure (11).

Figure (11) The average expenditure per capita during the converge of the aimed passes



#### 4.1.2 The Current Travel Pattern of the International Students

To obtain the desired change in the travel pattern of the international students in the Netherlands in case they had the same subsidy scheme the Dutch students have, the students were asked for their expenditures for using each type of transportation during the duration of their requested pass coverage. Also they were asked about the number of times their usage would be multiplied by if they were subsidized. The students were asked about their expenditures to facilitate getting the right information from them, because they would be aware of their expenditures and their usage after having free passes more than the number of passenger kilometers they conducted and they would conduct.

Firstly to know the current number of passenger kilometer conducted by each student, the usage of each mean of public transportation was converted to the monetary value for the original ticket which is the non group ticket without any kind subscription discount. This allowed unifying the units of calculation for the usage of the different students to the different means of transportation.

To calculate the original prices for the trips conducted using group tickets, two assumptions were made. The first one was the average price of each group ticket per passenger. Since the group ticket for 4 costs €32 for 4 passengers which is the minimum number of

passengers allowed to issue a group tickets, €33.5 for 5 passengers, €35 for 6 passengers and €36.5 for 7 passengers which is the maximum number of passengers for a group ticket, the price per passenger for a group trip could be €8, €6.7, €5.85 or €5.21 depending on the number passengers forming the group (Groepsticket, 2019). As a result, the average price per passenger for the different group tickets would be €6.44. The second assumption was the average of the original prices which is the fare the passenger has to pay for the same trip if he/she travelled without a group ticket for the trips conducted using the group tickets. Since the group tickets are used more for long distances trips because of their flat rates, the original price per passenger was assumed to be €20 for each group ticket trip. By dividing the sum resulting from the expenditures of the students on their group tickets by €6.4, the average number of trips for each sample was determined. Then by multiplying the result by €20, the original prices of the trips if the samples were using ordinary tickets were assumed. The samples that chose the weekday passes were spending €648 monthly on group tickets during the weekdays, so the total original prices of these tickets would €2,011. On the other hand, the students who chose the weekend pass were spending €1500 monthly on the group tickets, so the original prices of their tickets were €4,657, and the total original prices for the two groups was €6,668 monthly.

For the purchased tickets, the calculations varied based on the type of subscription each sample had. There were two groups excluded from these calculations, the first one contains the 7 students who chose to have the weekend pass, and they already have the Weekend Vrij subscriptions which allows them free transportation during the weekends, so their usage would not increase as they already have the access to the flat rate usage, as none of the students who chose the weekend pass has a Dal Vrij subscriptions which allow also free transportation during the weekends also, so they do not consider the prices of the tickets after paying the subscription, they would only save the €32 monthly which is the fare of the Weekend Vrij subscription. The second group was not fully excluded from the calculations, this group contains the 5 samples who chose to have the weekday pass and they have the Dal Vrij subscriptions, as they pay €106 for free transportation all the time, except for the peak hours, as the usage of this group also would not be changed outside the peak hours, so their usage during the peak hours only was calculated. (Products, 2019)

For the samples that did not have transportation subscriptions, their expenditures were calculated without being changed. For the other samples, their expenditures on transportation if they had the same trips without using any transportation subscription discount was calculated based on their types of subscriptions and the percentage of their expenditures during the peak hours. The total ordinary prices of the tickets fares for the samples that chose the weekend pass were €6,046 monthly if they conducted the same trips without having subscriptions excluding the group tickets.

For the samples that chose having weekday passes, they were asked about the percentage of their transportation expenditures during the peak hours, and the ordinary prices of their tickets during the peak hours if they did not have any subscriptions were calculated as the following:

- For those who have Dal Voordeel subscriptions which allows 40% discount except in the peak hours: their expenditures on the weekdays outside the peak hours were multiplied by 6/10, and during the peak hours were added without being changed
- For those who have Altijd Voordeel subscriptions which allows 40% discount except in the peak hours they get 20% discount: their expenditures on the weekdays outside the peak hours were multiplied by 10/6, and during the peak hours were multiplied by 10/8
- For those who have Dal Vrij subscriptions which allows they travel for free all the time except during the peak hours: only their expenditures during the peak hours were added without being changed
- For those who have Weekend Voordeel, Weekend Vrij subscriptions or do not have subscriptions at all, their expenditures were added without being changed because they either do not have a subscriptions to the public transportation, or their subscriptions are not allowing them any discounts during the weekdays (Products, 2019)

As a result, the ordinary tickets prices of the students who chose to have the weekday passes during the weekdays would be €4,840, the ordinary tickets prices of the students who chose to have the weekend passes during the weekends would be €6,046 while the total number for the all the samples would be €10,886.

The Netherlands applies the kilometer fare method to calculate the fares for using the public transportation. This method of calculation counts the number of kilometers conducted in a trip, and then multiplies it by the price per kilometer. After that the total is added to the basic fare to get the fare of the trip, so each passenger would pay according to his actual usage, regardless the zones and the locations he is interested in visiting (Kilometer fare, 2019). The national basic fare in the Netherlands is unified to be €0.96, but the kilometer fare differs from an operator to another (Boarding fare and basic fare, 2019). Although the kilometer fare differs, but it lies for different operator around €0.16, as for HTM, the kilometer price is €0.166 (Traveling with the OV chip card, 2019), for U-OV is €0.154 (Product details, 2019), for RET is €0.147 (Products and fares, 2019), for GVB is €0.162 (Public transportation fare, 2019) and for bring is €0.168 (Travel expenses, 2019). As an average, the kilometer price in the Netherlands would be assumed to be €0.16. Considering that the average trip distance in the Netherlands is 32.9 km (Sabir, 2011, p. 84), the average price per trip in the Netherlands would be  $(32.9 \text{ km} \times €0.16) + €0.96 = €6.224$ .

By dividing the expenditures of the students if they performed all their conducted trips without having any subscriptions or group tickets by the average price per trip in the Netherlands, the total number of trips performed by the samples was conducted. Later the passenger kilometer for each sample was obtained by multiplying the sample's average number of trips by 32.9 km which is the average trip distance in the Netherlands, so that the passenger kilometer for each sample was assumed. After calculating the average passenger kilometer for all the samples, the result was divided by the number of samples and multiplied by the number of the international students in the Netherlands, so the number of trips performed by the international students in the Netherlands during their desired pass coverage and the average number of passenger kilometers was obtained. Also these calculations covered the usage of the

students to the different means of transportation such as train, bus, tram and metro or other means according to the percentage of expenditures of each sample on the different means.

On the national level, the students who want to have the weekday passes conduct annually in millions 123 passenger kilometers using trains, 63.6 using buses, 7.6 using trams and metros and 9.7 using other modes of transportation. Their total passenger kilometers are 203.9, out of them 31.8% which are 64,770,621 passenger kilometers are conducted in the peak hours. For the usage during the weekends, the students who chose to have the weekend passes travel in million passenger kilometers 251 by trains, 45.4 by bus, 11.2 by trams and metros and 6 by other means of transportation, and the total sum of annual passenger kilometers is 313.65.

Adding the two groups of results would present the current usage of the international students in the Netherlands during the coverage of their desired passes. The result would be in million passenger kilometer 251 for trains, 109 for buses, 18.8 for trams and metros and 15.7 for the other means of transportation and the total would be 517,556,596 passenger kilometer annually. By comparing this number to the of passenger kilometers conducted in the Netherlands annually which is 25 billions (Key Transport figures 2018), the current percentage of the international students during their aimed passes coverage would be 2.07%, on the other hand, the number of the international students in the Netherlands is 122,000 (Netherlands attracts record number of international students, 2018) while the population of the Netherlands is 17.1 millions (Facts & Figures, 2014), so the percentage of the international students is 0.71% out of the total population. Figure (12) and Figure (13) show the model split for the international students in the Netherlands and their usage during the weekdays and weekends during their desired passes coverage, while Figure (14) shows the number of passenger kilometers and percentages of their usage distributed on the peak hours, off peak hours and weekends.

Figure (12) The public transportation modal split of the international students during the coverage of their desired passes

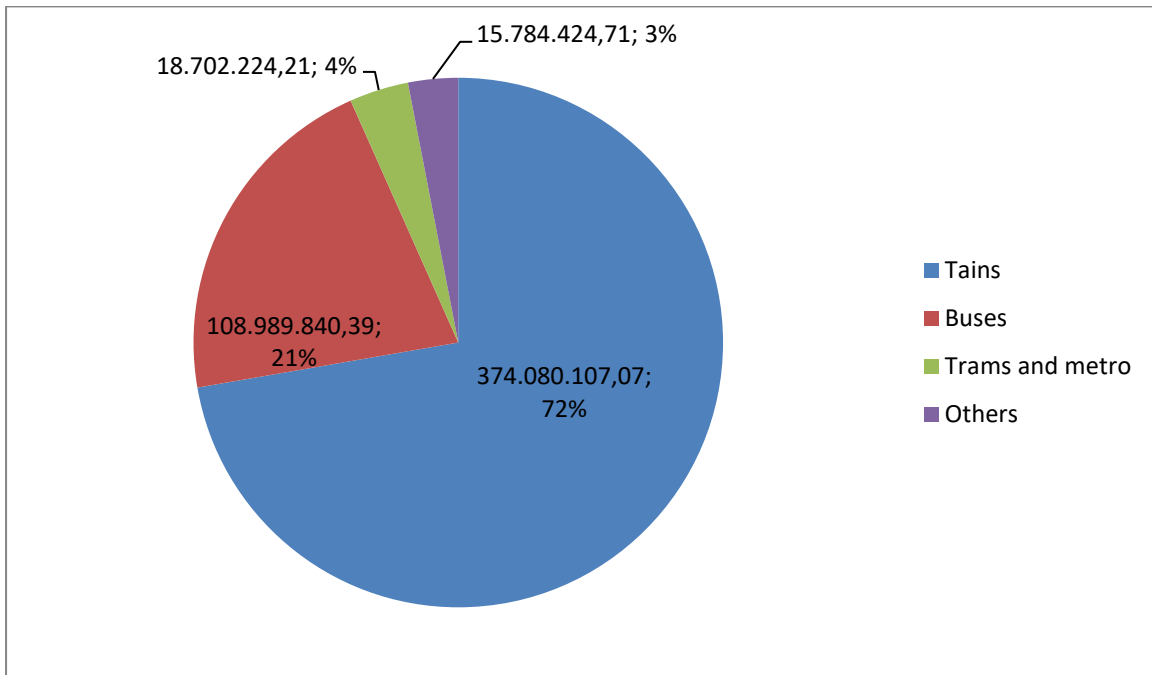


Figure (13) The public transportation usage of the international students during their desired passed during the weekdays and weekends

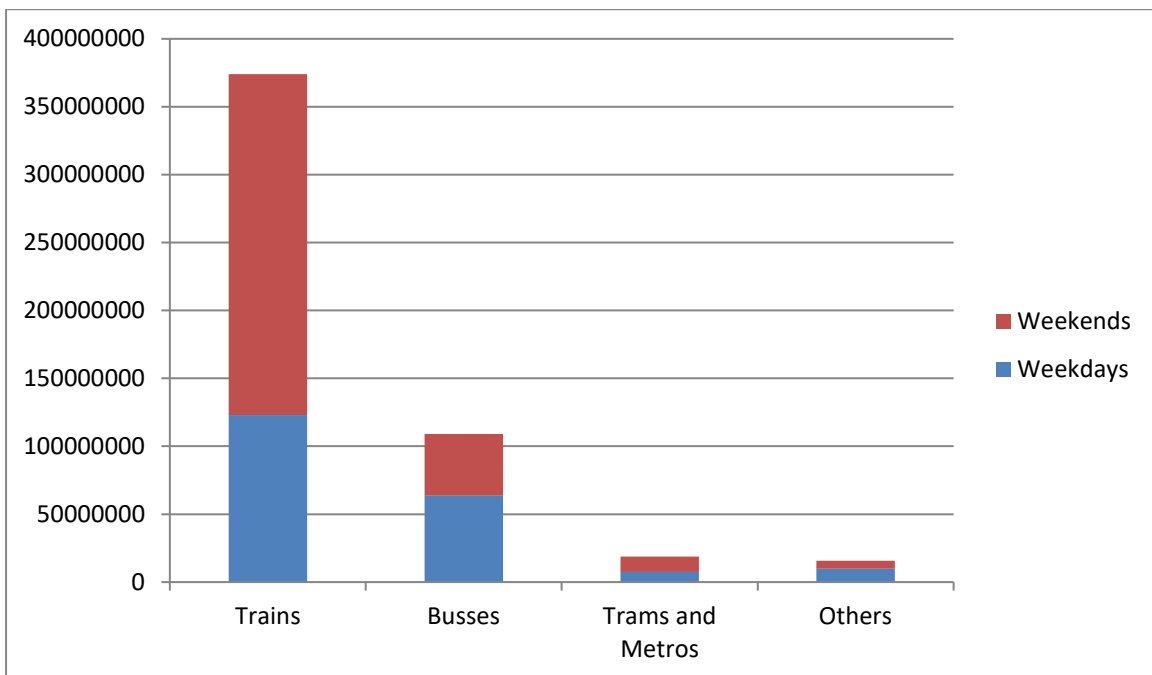


Figure (14) The public transportation usage of the international students during their desired passed during the peak hours, off peak hours and weekends

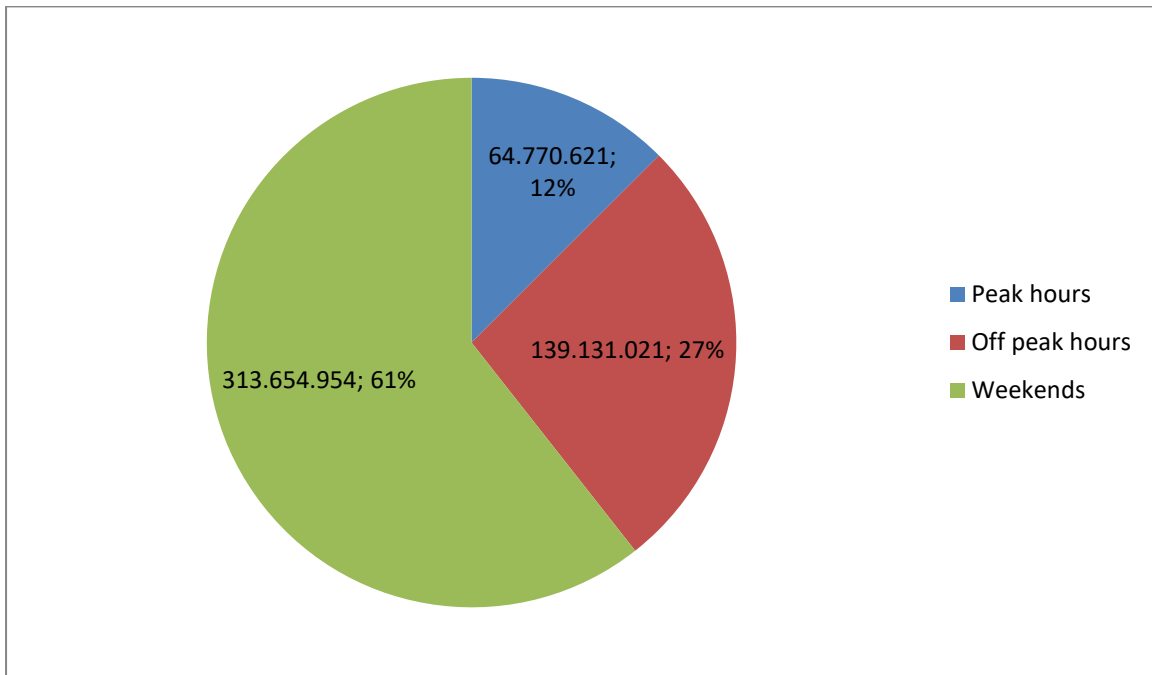


Figure (14) shows that 61% of the usage of the students to the public transportation is on the weekends, while the usage during the off peak hours have a share of only 27%, although 64% out of the samples choose to have the weekend pass. This reflects the need of the students to travel more on the weekends, as their current usage is higher than the samples that chose to have weekday passes.

#### 4.1.3 The Change in Travel Pattern of the International Students if They Were Subsidized

After determining the current use, the next step was forecasting the future use for each sample if they were allowed the same subsidy scheme the Dutch students have. This was calculated by multiplying the current usage of each sample to each mean of transportation by the rate of increase of usage the sample mentioned if they were allowed the transportation subsidy, as this was covered by the survey. It was mentioned in the survey that if the current usage of a sample to any mean of transportation was zero, the percentage of increase of this mean would be multiplied by €10, so that the each sample can reflect its own projections. After that, the current usage of each sample to each mean of transportation was deducted out of the future usage to calculate the increase in passenger kilometer. The last step was to aggregate the differences in passenger kilometer per mean of transportation, divided it by the 260 which is the number of valid samples, and then multiply the result by the number of international students in the Netherlands.

Figure (15) and Figure (16) show the percentage of increase in the students' passenger kilometers if they were able to choose between the free weekdays and weekends public



transportation. The two figures compare the percentage of increase of the usage during the peak hours, non peak hours and weekends and per mean of transportation to the current usage, regardless the percentage of students who had these choices. Through the figures, it is observed that the percentages of increase in passenger kilometer for the weekday usage exceed those for the weekend usage, except for the buses, but the increase in passenger kilometers is different because the majority of the samples chose to have the weekend pass. The percentages of increase during the weekends were 103.95% for the train usage, 165.83% for the bus usage, 196.74% for the trams and metro usage and 140.34% for the other means of transportation usage with a total percentage of increase of 116.91% for all the transportation means during the weekends. For the weekdays, the percentages were 148.53% for the train usage, 159.50% for the bus usage, 209.80% for the tram and metro usage and 222.08% for the other means usage with a total percentage of increase of 158.15% during the weekday, with a percentage of increase of 83.65% during the peak hours and 192.83% during the non peak hours.

Figure (15) The percentages of change of the passenger kilometer per mean of transportation

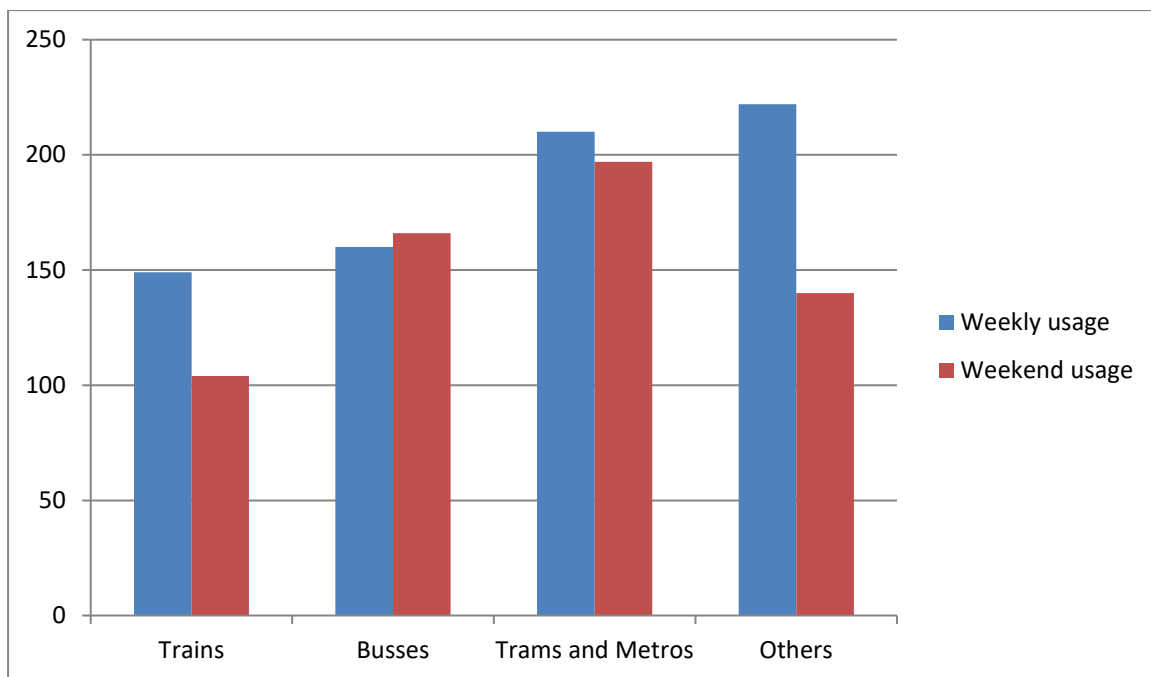
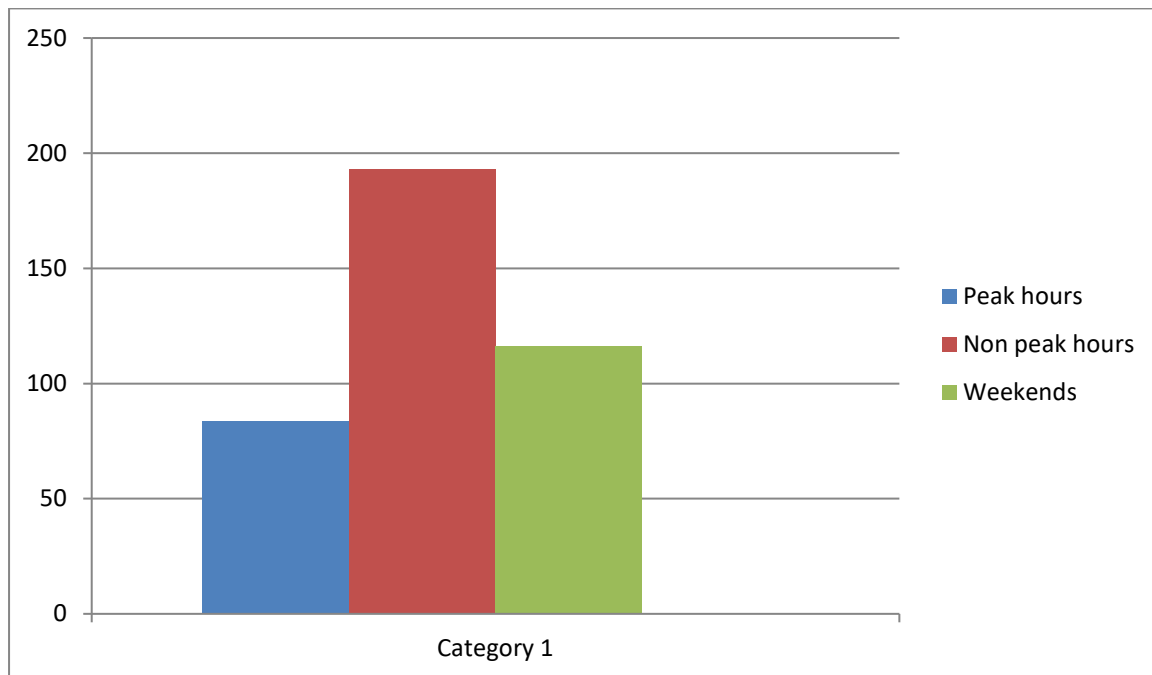


Figure (16) The percentages of increase in the students' passenger kilometers in the different timings



For the projections of the increased passenger kilometer for the international students in the Netherlands, they are presented in Table (4).

Table (4) The resulted increase in passenger kilometer

		Train	Bus	Tram and Metro	Other means	Total	
						Peak	Non peak
Weekdays	Total passenger kilometers	182,748	101,413	15,839	21,620	54,179	268,285
						322,463	
	Percentage of usage increase to the students' weekday usage	149%	160%	210%	222%	84%	193%
						158%	
Weekends	Passenger kilometer increase	260,956	75,304	21,942	8,489	366,691	
	Percentage of usage increase to the students' weekends usage	104%	166%	197%	140%	117%	
Total	Passenger kilometer increase	443,704	176,715	37,780	30,109	689,155*	
	Percentage of increase	118%	162%	202%	191%	133%	

Percentage of kilometer increase resulted from introducing the OV OV-studentenkaart in 1991**	50%	60%		73%
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\*All the numbers are presented in thousand passenger kilometer

\*\* Derived from (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006)

Litman weighted the elasticity of the tickets fare by 0.4%, so according to this percentage of elasticity, having the access to the free public transportation which means decreasing the prices of the tickets by 100% would result in 40% of increase in the passenger kilometer. Litman also highlighted that this percentage varies according to the different demographic, geographic factors and provided services (Litman, *Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning*, 2018, p. 18). Table (4) shows that the proposed percentage of increase in the usage of the international students is almost double the percentage of increase of passenger kilometers resulted from introducing the OV-studentenkaart in 1991, and both percentages are above the percentage Litman proposed for the elasticity rate. This would be the effect of the geography or the provided transportation services in the Netherlands, or it might be related to the demographic natures of the students Litman mentioned.

Another example from the Netherlands also to the increase of in the usage of the public transportation was providing free transportation between Den Hague and Leiden in 2004 by operating free bus line, as it increased the daily bus users from 1000 to 3000 –percentage of usage increase was 200% (Goeverden, Rietveld, Koelmeijer, & Peeters, 2006, p. 9), which is more that the proposed percentage of the increase in passenger kilometer. Lies between the two percentages of the documented percentages of increases of usage resulted from providing free public transportation forms additional validation to the results of research.

#### 4.2 The Effect of the Travel Pattern Change on the Dutch Public Transportation System

Adding the resulted passenger kilometers to the Dutch transportation system will result in an increase in the passenger kilometers conducted annually on the national level. That would affect the transportation plans for the different means in different times. To determine those effects, the percentages of change in the usage of the different public transportation means in the different times were calculated. As, the annual increase in the passenger kilometer was 0.69 billion, while the passenger kilometer for the Dutch public transportation was 25 billion. Consequently, the percentage of the total increased passenger kilometers would be 2.75% only. This number is divided in Table (5) in two ways, vertically which presents the percentages of change of the passenger kilometers per mean of transportation, and horizontally which presents the percentages of change of the passenger kilometers during to the peak hours, non peak hours, weekdays and weekends.

For the different means of transportation, the percentages of increase was 2.34% for the trains passenger kilometer, as their conducted passenger kilometers in the Netherlands are 19 billion, while the added ones are 0.44. For the bus, tram and metro, the percentage would be

3.9%, as the conducted passenger kilometers in the Netherlands are 5.5 billion, and the added ones are 0.21. The percentage for the other means would be 6.02%, as the conducted passenger kilometers on the national level are 0.5 billion, while the increased ones are 0.03 (Key Transport figures 2018). It was observed that the highest percentage of the increased passenger kilometers was during the weekends; it was 7.33%, while the increase was only 1.61% during the weekdays. The highest percentage of increase for the weekdays was 2.19% during the peak hours and the least percentage of increase was 0.69%.

To calculate the usage of the different means of public transportation in the Netherlands during the weekdays and weekends, the usage of each mean was assumed to be distributed as 80% for the weekdays and 20% on the weekends, these percentage was calculated generally based on the numbers presented in “Transport and Mobility 2016” report (Transport and Mobility 2016, 2016), while the “International Benchmark 2011 – 2015” published by Prorail mentioned that the percentage of the usage during the peak hours is 39% (International Benchmark 2011 – 2015 ProRail / NS, 2017, p. 23). So this percentage was used to determine the passenger kilometers conducted on the national level during the peak and non peak hours. Both percentages from the two sources did not present detailed percentage of usage for each mean of transportation; those percentages were assumed for the different means and used to conclude the number of passenger kilometers conducted using each mean of transportation during the weekends, weekdays, peak hours and non peak hours using the total passenger kilometers for each mean respectively.

Table (5) The effects of the added passenger kilometers on the transportation network

		Weekdays			Weekend	Total
		Peak	Non peak	Total		
Train	Increase in passenger kilometer*	0.03	0.15	0.18	0.26	0.44
	Passenger kilometer in the Netherlands	5.93***	9.27***	15.2**	3.8**	19****
	Percentage of increase	0.52%	1.64%	1.2%	6.87%	2.34%
Bus, Tram and Metro	Increase in passenger kilometer*	0.02	0.1	0.12	0.1	0.21
	Passenger kilometer in the Netherlands	1.72***	2.68***	4.4**	1.1**	5.5****
	Percentage of increase	1.15%	3.63%	2.66%	8.84%	3.9%
Other means	Increase in passenger kilometer*	0.00	0.02	0.02	0.01	0.03
	Passenger kilometer in the Netherlands	0.16***	0.24***	0.4**	0.1**	0.5****
	Percentage of increase	2.33%	7.37%	5.41%	8.49%	6.02%
Total	Increase in passenger kilometer*	0.05	0.27	0.32	0.37	0.69
	Passenger kilometer in the Netherlands	7.8***	12.2***	20**	5**	25****
	Percentage of increase	0.69%	2.19%	1.61%	7.33%	2.75%
The distribution of percentages of the total increase*		8%	39%	47%	53%	100%

Sources:

\* Results of the survey

\*\* Calculated depending on (Transport and Mobility 2016, 2016) and (Key Transport figures 2018)

\*\*\* Calculated depending on (International Benchmark 2011 – 2015 ProRail / NS, 2017),

(Transport and Mobility 2016, 2016) and (Key Transport figures 2018)

\*\*\*\* (Key Transport figures 2018)

\*\*\*\*\* Calculated depending on (Key Transport figures 2018)

\*\*\*\*\* All the passenger kilometers are calculated in billions on annual basis

#### 4.3 The cost of the change in the operational plans resulted from the increased passenger kilometers

According to Lenferink, a change in operational plan of any public transportation system due to additional passenger kilometers would happen only if the occupancy rates exceeded 100%. Consequently, if there are still available seats on a public transportation mean, there are no extra costs involved. On the other hand, Lenferink sees that to calculate the exact changes in operational plans by increasing the number of buses as an example and after knowing that there are no available seats in a certain mean of transportation at a certain time, each certain transportation line has to be revised to determine the occupancy figures and relate this to the share that this line has out of the additional passenger kilometers (Lenferink, 2019). Because of the different limitations, this subchapter was not able to do the accurate calculations as Lenferink mentioned, but it discusses the overall results and relates them to the available rough data.

The mean of transportation that has the highest shares out of the added passenger kilometers is the train; it has 56.67% out of the passenger kilometers increased during the weekdays, 71.17% out of the increased passenger kilometers during the weekends and a total of 64.38% out of the total increased passenger kilometers resulted from allowing the international students to choose to have either weekday or weekends free public transportation.

For the occupancy rates in the Netherlands in general, they are divided into off peak occupancy rates which includes the non peak hours and weekends and peak hours. The occupancy rates during the off peak hours were 29% in 2013 and they decreased to 28% in 2014 and 2015. For the peak hours, the occupancy rates were 98.7% on the national level and 96.5% for the key routes which are the 10 busiest routes according to the annual report of NS in 2015 (Annual Report 2015, 2016, p. 7). The annual report for 2016 did not mention any changes in the occupancy rates (NS Annual Report 2016, 2017), but the annual report of 2017 mentioned that more trains were planned to operate during the peak period in 2018 and that would lead to decrease in the occupancy rates for the trains without mentioning the percentages (NS Annual Report 2017, 2018, p. 27). Until this research was drafted, the annual report for 2017 for NS was the most updated one because the report for 2018 was not yet published.

Table (6) shows the occupancy rates for the trains after adding the passenger kilometers that would be conducted if the international students in the Netherlands were allowed to have either free weekends or weekday transportation.

Table (6) The occupancy rates of the trains

	Peak hours	Non peak hours
Occupancy rates in 2017	98.7%	28%
Added passenger kilometers*	0.03	0.63
Percentage to the conducted passenger kilometers	0.52%	3.14%
Proposed occupancy rates	99.22%**	28.89%

\* Numbers of passenger kilometers are in billions annually

\*\* The percentage of the proposed occupancy rates during the peak hours did not include the decrease in the occupancy rate achieved in 2018, and it shows the effect of subsidizing all the international students in the Netherlands

For the occupancy rates of the buses, trams and metros on the national level, the occupancy rates are not documented (Openbaar vervoer: In grote steden gebruiken veel mensen het ov, 2015). As a result, this research was not able to determine the exact change in the occupancy rates of each mean of transportation after applying the proposed subsidy. As guidance to document if the occupancy rates would exceed the acceptable percentages so that they would affect the operational plans and result in affecting the operational cost, general data about the occupancy rates of the buses, trams and metros in the Netherlands were used.

“Paradigm shifts by multimodal user oriented transport services and platforms” is a research paper which discusses the paradigm shifts of the future multimodal transportation. Through their paper; the authors compared the risks of the buses, trams and metros operations in the Netherlands in different situations. They applied these risks on different operating scenarios that the Dutch buses, trams and metros operational plans might use such as applying demand public transportation using the current fleet, applying demand public transportation using autonomous fleet of different sizes and using full automated fleet with similar sizes to the current one. The only shared risk between the different scenarios was the low occupancy rates of the buses, trams and metros. The authors proposed to enhance/ increase the occupancy rates of the buses, trams and metros through changing the prices of the tickets and they highlighted the fact of the low occupancy rates especially at the off-peak hours describing it as a challenge that has to be solved (Chen, Quak, Wilmink, & van Meijeren, 2018, p. 2). The annual report of NS for 2015 highlighted the relation between the social benefits and the occupancy rates of the buses through the data they collected throughout several months for specific lines at Rosmalen by stating “The relative social benefits would balance out against the extra financial burden if the occupancy rates of the rush-hour buses were above 80%” in the conclusion of this experiment, the report stated that to increase the social return of the buses usage, the occupancy rate has to be raised (Annual Report 2015, 2016, p. 104).

As a conclusion for the occupancy rates of the buses, trams and metros in the Netherlands are far from reaching the 100% of occupancy rates and changing operational plans

due to an increase of the 3.9% in the total passenger kilometers, 5.15% during the off peak hours and only 1.15% during the peak hours. This Highlights the decrease in the occupancy rates of these means that were reported in private researches and public reports as mentioned previously, so increasing the occupancy rates would help in addressing one of the risks facing these means.

For the other means of transportation, only one source was available for “Westerschelde Ferry BV” operating between Vlissingen and Breskens, as their annual report for 2018 mentioned that the percentage of availability on the ferries reached 98.2% in 2017. Although this percentage of availability allowed the operator to provide the passengers with reliable service for transporting the passengers and their bikes all the time, but it decreased the exploitation of the ferries since the income was not sufficient for performing the adequate maintenance (Advies toekomstbestendigheid en exploitatie Westerschelde Ferry, 2018, p.3). As a result of the available data on the other transportation means, adding 6.02% to the total passenger kilometers in general divided as 7.69% during the off peak hours and 2.33% during the peak hours would not form a burden on those means, but these additions might help them to sustain their operations and maintenance.

“Dr. Lenferink” who is an assistant professor of mobility had similar conclusion to what the calculations performed through this research led to. He expected that allowing the international students in the Netherlands to have weekday or weekend passes would not have any additional operational cost during the non peak hours and the weekends because of the low occupancy rates on the national levels, and the low increase in passenger kilometers proposed if subsidy was applied. On the other hand, Dr. Lenferink was not sure about the ability of the occupancy rates at the peak hours to accommodate the proposed increase in the passenger kilometers (Lenferink, 2019). The calculations presented similar results as at the non peak hours, the occupancy rates were low and they did not reach the 30% for trains after adding the proposed passenger kilometers of the international students and the used sources show similar results for the other means. During the peak hours, the calculations show that the added passenger kilometers to the train usage would be accommodated since the occupancy rates are high, as it would reach 99.22% for trains, but this is without considering the additional trains operated during the rush hours in 2018, so Dr. Lenferink was not sure that the proposed passenger kilometers would let the occupancy rates exceed the 100% or not.

Since the occupancy rates of the different means during the different timings are able to accommodate the proposed additional passenger kilometers resulted from allowing the international students the same subsidy scheme the Dutch students have, the operational plans of the different means would not change and therefore there would not be any difference in the operational costs. For some means such as buses and ferries, increasing the number of passengers would result in additional social benefits from the operating means (Chen, Quak, Wilmink, & van Meijeren, 2018, p. 2) (Annual Report 2015, 2016, p. 104), as it would increase the social and financial activities in the different locations.



#### 4.4 The target group

Since this research studies allowing the international students the same public transportation subsidy scheme that the Dutch students have, it would be highlighted that not all the Dutch students are allowed to have the same subsidy all the time. Therefore applying the same subsidy scheme would not allow all the international students to have this transportation subsidy. As mentioned in Figure (1), students over 30 years old, part time students and those who study courses of durations less than one year are excluded from this subsidy, so the international students having the same situations would be excluded also (Eligibility for student finance, 2019).

The Dutch students who study or have internships abroad receive a financial compensation can deactivate their student travel products and apply for financial compensation for their transportation usage during the period of their study abroad or internships (Studying abroad, 2019). This means that the Netherlands subsidize the transportation of the Dutch students even if they were abroad, so applying this methodology on the international students, two groups would be formed. The first group which has their host universities in the Netherlands, they would be subsidized, the other group which are the semester-based students or those who spend the academic year as exchange students and cannot fulfill the requirements of having the subsidy. Since they do not study a full course in the Netherlands and as their academic engagement in the country do not exceed the semester or the academic year, meaning that they are not studying a full degree. These students might be having another transportation subsidy through their countries of their host universities which is the same system applied in the Netherlands, and also the Netherlands cannot track them to be able to get back the fund if they did not finish their study during the allowed duration.

Deducing the mentioned groups out of the subsidized students means decreasing the presented numbers related to the cost of the proposed subsidy resulting from the decrease of the revenue of the public transportation, and decreasing the passenger kilometers and the increase in the occupancy rates by more than 30%, since the exchange students in the Netherlands form 90,000 out of the 122,000 international students (Pieters, 2018). As a result, the total current expenses of the international students that they would save would be **less than €52,342,615**, as this amount represents the usage of the non exchange international students in the Netherlands. Also this number represents the amount would be covered by the state or by any other party. Moreover the international students who cannot fulfill the other requirements related to the age and the duration of study would be also deduced from this amount. Also applying this scheme of the transportation subsidy on the international students would result in less occupancy rates than the mentioned in the calculations, because the exchange students and the students who are not able to fulfill the requirements of studenten OV-Chipkaart such as studying a 1 year or more program, being less than 30 years old or finishing their studies in

less than 10 years were not excluded out of the calculations. (Eligibility for student finance, 2019).

After allowing the international students the same subsidy scheme that the Dutch students have, the number of subsidized international students, cost of subsidy, and their effect on the occupancy rate of the trains during the peak hours would be represented in the following equations

1. Subsidized students =  $I.S - E.S - S \geq 30 - S.D < 1 - S.D \geq 10 - PT. S$   
 $= 112,000 - 32,000 - S \geq 30 - S.D < 1 - S.D \geq 10 - PT. S$   
 $= 90,000 - S \geq 30 - S.D < 1 - S.D \geq 10 - PT. S$
2. Cost of subsidy = **€52,342,615** - [(S.A  $\geq$  30 - S.D < 1 - S.D  $\geq$  10 - PT. S) X €582]
3. Occupancy rate of trains during the peak hours  
 $= O.R\ 2017 - O.R\ added\ 2018 + O.R\ (I.S) - O.R\ (E.S) - O.R\ (S \geq 30 - S.D < 1 - S.D \geq 10 - PT. S)$   
 $= 98.7\% + 0.52\% - 0.14\% - O.R\ added\ 2018 - O.R\ (S \geq 30 - S.D < 1 - S.D \geq 10 - PT. S)$   
 $= \mathbf{99.08\% - O.R\ added\ 2018 - O.R\ (S \geq 30 - S.D < 1 - S.D \geq 10 - PT. S)}$

I.S is the number of the international students in the Netherlands (112,000)

E.S is the number of the exchange students in the Netherlands (32,000)

S.A  $\geq$  30 is the number of students over the age of 30

S.D < 1 is the number of students who study for programs less than one year

S.D  $\geq$  10 is the number of students who did not complete their study during 10 years

PT.S is the number of part-time students

O.R is the occupancy rate

O.R 2017 is the occupancy rates of the trains during the peak hours in 2017

O.R added 2018 is the effect of the added trains in 2018 on the occupancy rates

Equation 3 shows the effect of adding the occupancy rate caused by the added usage of students to the trains during the peak hours. This equation presents the effect of the proposed subsidy on the mean of transportation having the highest occupancy rates which is the train, and during the timing having the highest occupancy rates which is the peak hours. The calculations do not show the final resulted occupancy rates because of the research limitations, but it shows that the resulted occupancy rate would definitely be less than 99.08%. Out of this percentage, the usage of certain groups of students would be subtracted because they cannot fulfill the criteria of having their transportation subsidy. These groups are international students

over 30 years old, students studying less than 1 year program, part-time students and the students who fail to finish their study in 10 years. This percentage also would be subjected to another deduction which represents the difference in occupancy rates caused by the added trains during the peak hours in 2018 (NS Annual Report 2016, 2017, p. 27). Relating this result to the mobility literature and to Dr. Lenferink, as both mentioned that the added usage of transportation would not cause an added cost to the operational cost unless the occupancy rates exceeded the 100% (Lenferink, 2019) (Peak Occupancy Rate, 2014), as the added usage would make use of the surplus of the available seats. This means that the added usage resulted from subsidizing the transportation of the international students would not add any cost to the operational cost of the busiest mean of transportation during the busiest time in the Netherlands, and to the other means during the different time, as they have lower occupancy rates.

## 5. Discussion

### 5.1 Conclusion

The aim of this thesis was to determine the cost of allowing the international students in the Netherlands the same subsidy scheme allowed to the Dutch students as a tool to achieve the transportation equity between the two groups. Based on a quantitative analysis of the current and the future usage of the international students in the Netherlands if they were allowed the mentioned subsidy scheme, and the qualitative analysis of the occupancy rates of the public transportation in the Netherlands, this cost was calculated.

The results indicated that the added passenger kilometers resulted from the additional usage of the international students if they were subsidized would not affect the transportation operational plans. This was determined because the current occupancy rates of the Dutch transportation network can accommodate the increased passenger kilometers resulting from subsidizing less than 90,000 international students. This increase in passenger kilometers based on the survey results would be less than 468 millions of passenger kilometers during the off peak hours, and less than 40 millions of passenger kilometers during the peak hours annually. The transportation network can accommodate this increase only depending on the surplus of the seats within the public transportation in the Netherlands without reaching the 100% of occupancy rates, so it would not affect the operational cost (Peak Occupancy Rate, 2014). The previous main results are consistent with the theories identify the relation between the increase in passenger kilometers and the operational cost, as Rietveld stated “An additional passenger does not lead to a proportional increase in capacity so that the marginal costs are lower than the average costs” (Rietveld, Dekkers, & van Woudenberg, 2001, p. 1).

On the other hand, subsidizing the public transportation of the international students would result in decreasing the revenue of the public transportation operators by less than €52,342,615 annually. This is resulted from the tickets and subscriptions the students would not buy anymore because they would depend on their free travel subsidies instead, so this would be the only cost of allowing the international students the same subsidy scheme the Dutch students have.

Although the proposed subsidy affects the state budget, it has different advantages to the state, as it would increase the social benefits resulted from the operating means of transportation through increasing the number of users, passenger kilometers, conducted trips, visited places, applicants for students jobs or internships and more spreading of the benefits of the housing markets especially in the cities which are not classified as “student cities” through giving the international students more access to them. This was clearly mentioned by Litman as he stated “The incremental cost of accommodating additional passengers is low, so strategies which increase average transit vehicle occupancy increase efficiency benefits. Put differently, if buses have empty seats, there is minimal cost and large potential benefits if they can be filled by travellers who would otherwise drive” (Litman, Evaluating Public Transit Benefits and Costs: Best Practices Guidebook, 2018, p. 29). These positive effects are presented also by the

Land Use – Transportation feedback cycle which presented in Figure (2) (Wegener, 1999, p. VII), and in Meurs' argument, as they argue that the increased mobility stimulate the economy of a certain community by increasing the accessibility to the different activities, while Wegener added that this will positively affect also the land use planning (Meurs, 2019). Those two theories are aligned with the survey outcomes, as most of the samples stated that they have limited access to transportation services and they would conduct more activities if they were subsidized and there is a proposed increase in the passenger kilometers which forms an evidence for the more activities the students would have.

The distribution of the added passenger kilometers among the different times showed that the students have more tendencies to travel outside the peak hours. This agrees with the German experience regarding the Semester tickets which allows the students the flat rate usage of public transportation. Voss stated that the students are more likely to travel during the non-rush hours, so they are filling the empty seats (Voss, 2015, p. 6). The results of the conducted survey lead to the same conclusion, as the majority of the students chose to have the weekend passes, while the proposed added passenger kilometers of the students who aimed for weekday passes concentrated more on the non peak hours. This decreases the probability of affecting the transportation operational plans, as the occupancy rates are higher in the peak hours where the students are less interested to travel compared to the non peak hours.

The different groups of the community do not have the same affordability levels. The state has the responsibility to assure that all the groups can afford the basic services and this is the reason behind the different governmental aids like pensions, unemployment aid and similar social aids. This applies also for the transportation as a service and the accessibility as its end goal. The threshold of the equity in transportation would be only achieved if the different groups in a community have the ability to reach their essential and basic activities and their social activities including education, employment and recreational activities (Litman, *Evaluating Transportation Equity: Guidance For Incorporating Distributional Impacts in Transportation Planning*, 2018, p. 7). Applying this theory on the students in the Netherlands, it was found through the survey that 65.2% of the samples mentioned that the high transportation cost in the Netherlands did not allow them to attend some of their classes, other academic activities, participating in social events and visiting recreational places and events. This proves the insufficient level of equity in transportation dedicated to the international students in the Netherlands. As a result, the Netherlands would be having a good mobility and transportation system, but some groups such as the international students would be falling under the Transportation Poverty Line, as they are not able to afford paying for this high quality service (Golub & Martens, 2014, p. 18). Therefore the Dutch transportation subsidy dedicated to the students achieves neither equality nor equity because the international students do not have the access to the same subsidy of the international students and they have limitations in fulfilling their needs because of the transportation cost.

The subsidy should go to those who fall under the poverty line specifically to avoid making the rich people richer and to target only decreasing the number of persons falling under the poverty line (Chakravarty & Mukherjee, *Optimal Subsidy for The Poor*, 1998, p. 313). In line with this, applying the concept of Transportation Poverty Line introduced by Gloub and

Martens on the conducted survey identifies that two thirds of the international students in the Netherlands fall under the Transportation Poverty Line, so the international students are forming a disadvantaged group in the Dutch community that has to be subsidized. Also this is supported by the definitions of a community introduced by Diaz and discussed in 2.8 which identify a community based on living in common localities, advantages expected to be received from other community members, integration in the social interactions and other factors which do not include the nationalities (Diaz, 2000).

The Dutch government welcomes the highly skilled labours, not only by allowing them having highly skilled migrant visas, but also by allowing them in certain conditions not paying taxes on 30% of their incomes for their first few years in the Netherlands (30% facility for incoming employees, 2019). Also for the Netherlands tries to attract the high levels graduates after finishing a study program or a doctoral program in the Netherlands or abroad through allowing them an orientation year visa where they can live and search for work in the Netherlands for one year (Looking for a job after study, promotion or research, 2019). This means that the country needs and welcomes the graduates and the highly skilled labours. Enhancing the financial and social situations of the current students who are potentially the future graduates in the Netherlands would attract more students to study in the country or attracts more students to know more the Dutch culture, be engaged in different activities or staying in the Netherlands after finishing their studies, so it would be another kind of attracting educated labour on the Dutch academic level rather than letting other highly skilled labours not paying taxes on 30% of their incomes, and they would be already familiar with the country and having academic degrees on the Dutch educational levels.

Comparing to Germany which has the highest percentage of international students in the Netherlands by 18%, and this is the highest among the international students in the country (Key figures, 2018), there are no differentiation between the German and the international students regarding the semester ticket. Berlin started allowing another service to the students in addition to their semester tickets, as it allows them to accompany their bikes for free starting from August 2019 (Ammar, Free students ticket for public transportation in Berlin, 2019), at the same time, the international students in the Netherlands are still signing a petition asking for equity and equality in transportation subsidy. Also the Dutch students are treated in another way in Germany, as those who study in the NRW are allowed to use the public transportation for free to reach Dutch cities such as Venlo, Nijmegen, Millingen, Arnhem and Zevenaar, as they are included in the semester ticket of the NRW (SemesterTicket NRW, 2019), while the German students in the Netherlands cannot have any transportation subsidy for being students in the Netherlands.

The international students especially those who come from developing countries to study in a first world country face different financial obstacles, as the exchange rates and the prices are always limiting them. When these students arrive to their destinations, they are keen on seeing a different world, as there are many new experiences for them. They want to explore different cities, attend different cultural events and get exposed to the country where they study. These students calculate every single euro they spend, as it was very hard for them to save for their living expenses and tuition fees and if they succeeded to save some money during their

studies, their savings would have great values for them when they go back to their homes. Not allowing these students any kinds of transportation subsidy in the Netherlands means that these students are having restrictions to go to any un-bikeable destination. At the same time subsidizing the Dutch students because it is not easy for them to finance their transportation full fare creates an inequality an inequity gap between the two groups, as the international students also are not able to fulfill their transportation needs.

Allowing the international students in the Netherlands the same transportation subsidy scheme would positively affect the international students, in addition to the potential positive effects of increasing the social benefits resulting from increasing the occupancy rates, engaging potential skilled labors in the Dutch community and achieving the horizontal and the vertical equity without having additional operational costs, as the only effect would be resulted from the reduced revenues. At the end, is it worth to spend €52,342,615 annually out of the public budget to achieve the equity as an ultimate goal, in addition to the other potential benefits?

## 5.2 Research Limitations

The research faced number of limitations. For the data collection regarding the current and the future usage of the students to the public transportation, a survey was posted on different groups of social media platforms, so the built samples neither had equal distribution on the different cities on the Netherlands, nor being distributed according to the distribution of the students among the different cities. For the second phase of the data collection which was concerned about the occupancy rates of the different means of transportation, the occupancy rates of the different timings were found for the trains, but they were not updated, and they were not found for the other means of transportation, as they are not documented on the national level, so other resources mentioning the general status of the different means were used. Also for the distribution of the current passenger kilometers in the Netherlands during the peak hours, non-peak hours and weekends, these percentages were found only for the trains, and they were used for the calculations for the other means.

## 5.3 Recommendations

- The effects of subsidizing the transportation of the international students in the Netherlands on the increased passenger kilometer would be examined in details on the local levels to the determine its effects on each bus, tram, metro and train lines especially in the students' cities and the attraction sites, as the calculated occupancy rates for the total usage might differ for certain lines at certain times
- The positive effects of the proposed subsidy in the national and the local levels would be studied especially for the effects on the housing market, the social and cultural events, the labor market and land use

- Out of the international students in the Netherlands, the numbers of students who cannot achieve the criteria of having the transportation subsidy would be documented. This allows the further researches to calculate the added passenger kilometers and the difference in revenues of public transportation more accurately
- As an immediate measure, since the occupancy rate during the off peak is low, and there are directly benefits out of increasing the occupancy rates during those times, the subsidy of the international students would start by 1 year of subsidy during the off-peak hours. This also would fulfill 92% of the desired students' trips if they were allowed the transportation subsidy. For the 8% of not fulfilled transportation needs during the peak hours, part of the students would shift their desired usage to the off peak hours, and other percentage would be still missed until the calculations for the effects on each transportation line would be done
- During implementing the subsidy during the off peak hours, the effects on the occupancy rates during the peak hours would be examined for each mean for each line
- For financing the subsidy:
  1. The state can pay less than €52,342,615 to subsidize the full time international students who fulfill the requirements of the subsidy
  2. Each student can pay €582 to have flat rate subscription during the weekdays or the weekends
  3. The students can pay part of it, while the state can pay the other part
- For assuring that the students would finish their studies within 10 year, which is a requirement for having the studenten OV-Chipkaart, the students can pay the full amount of subsidy, and after passing this requirement by graduation, he can receive back the money
- The subsidy might be optional, so each student can choose to have it or not



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## **Annex 1 Survey for the international students' usage of public transportation in the Netherlands**

Dear Participant,

I am an international student who studies a Masters in Urban and Regional Mobility in Radboud University. This survey will be used for academic purposes as a part of my Master's thesis. The purpose of this survey is to measure the usage of the international students in the Netherlands to the public transportation in the current state, and if they were allowed the same subsidy scheme the Dutch students have. The current subsidy scheme for the Dutch students allows them using the public transportation for free on the public holidays in addition to choosing either to have totally free public transportation on the weekdays or the weekends all over the Netherlands.

Thank you for paying time and effort to answer this survey completely.

### **I. Demographic Background**

1. In which city do you study?

\_\_\_\_\_

2. Where do you come from?

\_\_\_\_\_

### **II. Public Transportation Usage**

**Answer this section based on your average current and future usage to the public transportation in the Netherlands if you were allowed to have the same subsidy scheme the Dutch student have**

3. Do you have any public transportation subscription?\*

a. Yes      b. No

(if the answer was "No" the next survey transfers automatically to question 5 without passing by question 4)

4. If yes, which type of public transportation subscription do you have?

a. Weekend Benefit (you pay €2 per month and get 40% discount on the weekends)

b. Valley Benefit (you pay €5 per month and get 40% discount all the time except for the rush hours)

c. Always Benefit (you pay €24 per month and get 40% discount all the time except for the rush hours you get only 20% discount)

d. Weekend free (you pay €32 and get unlimited travel on the weekends)

e. Valley free (you pay €106 per month and get unlimited travel all the time except for the rush hours)

f. Always free (you pay €347 per month and get unlimited travel all the time)

5. If you were allowed to choose either to travel for free during the weekdays or the weekends, you will choose having
  - a. Weekday pass (travel for free during the weekdays and the public holidays)
  - b. Weekend pass (travel for free during the weekends and the public holidays)
    - if the choice was “Weekday pass” the survey transfers the sample to the section targeting his weekday usage, and then to the open questions
    - if the choice was “Weekend pass” the survey transfers the sample to the section targeting his weekend usage, then to the open questions
    -

### III. (Option 1) Weekday passes

(If your answer on any question asking about your current usage was 0, your answer for your future usage concerning the same aspect will be multiplied by €10)

6. How much do you pay for group tickets per month during the weekdays?  
\_\_\_\_\_
7. How much do you pay for the public transportation monthly during the weekdays (excluding the group tickets and the monthly subscriptions)?  
\_\_\_\_\_
8. How much do you pay currently for the public transportation monthly during the rush hours (excluding the group tickets and the monthly subscriptions)? (The rush hours are the times between 6:30 am and 9:00 am, and between 4:00 pm and 6:30 pm in the during the working days)  
\_\_\_\_\_
9. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your train trips during the weekdays?  
\_\_\_\_\_
10. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your bus trips during the weekdays?  
\_\_\_\_\_
11. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your tram and metro trips during the weekdays?  
\_\_\_\_\_
12. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your trips during the weekdays conducted by other means?  
\_\_\_\_\_
13. How many times would your usage to the trains be multiplied by on the weekdays if you had the weekdays pass? (you can use a decimal number)  
\_\_\_\_\_
14. How many times would your usage to the buses be multiplied by on the weekdays if you had the weekday pass? (you can use a decimal number)  
\_\_\_\_\_



15. How many times would your usage to the trams and metros be multiplied by on the weekdays if you had the weekday pass? (you can use a decimal number)
- \_\_\_\_\_
16. How many times would your usage to the other public transportation means would be multiplied by on the weekdays if you had the weekday pass? (you can use a decimal number)
- \_\_\_\_\_
17. How many times your usage to the public transportation would be multiplied by on the rush hours if you had the weekday pass? (you can use a decimal number)
- \_\_\_\_\_

### III. (Option 2) Weekday passes

(If your answer on any question asking about your current usage was 0, your answer for your future usage concerning the same aspect will be multiplied by €10)

6. How much are you paying for group tickets per month during the weekends?
- \_\_\_\_\_
7. How much do you pay for the public transportation monthly during the weekends (excluding the group tickets and the monthly subscriptions)?
- \_\_\_\_\_
8. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your train trips during the weekends?
- \_\_\_\_\_
9. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your bus trips during the weekends?
- \_\_\_\_\_
10. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your tram and metro trips during the weekends?
- \_\_\_\_\_
11. Out of your monthly expenditures on the public transportation, what is the percentage you pay for your trips during the weekends conducted by other means?
- \_\_\_\_\_
12. How many times would your usage to the trains be multiplied by on the weekends if you had the weekend pass? (you can use a decimal number)
- \_\_\_\_\_
13. How many times would your usage to the buses be multiplied by on the weekend if you had the weekend pass? (you can use a decimal number)
- \_\_\_\_\_
14. How many times would your usage to the trams and metros be multiplied by on the weekends if you had the weekend pass? (you can use a decimal number)
- \_\_\_\_\_

15. How many times would your usage to the other public transportation means would be multiplied by on the weekends if you had the weekend pass? (you can use a decimal number)

\_\_\_\_\_

#### **IV. Open Questions**

18. Do you feel the unequal treatment between you and the Dutch student regarding the transportation subsidy scheme they have? Please specify.

\_\_\_\_\_

19. Did the cost of the transportation prevent you from attending any event, activity? How was the essentiality of this event/ activity to you?

\_\_\_\_\_