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„What makes a good public transport system? A critical
analysis of European metropolises “

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ABSTRACT

Urban populations are increasing alongside the demand for sustainable mobility within cities. This thesis provides insights into how well-functioning public transport systems are established in European metropolises. To identify the components and characteristics that make up a successful public transportation system, the study examined nine different public transportation systems in nine metropolises. Analyzing these systems helps to clarify, how service should be delivered considering the specific circumstances of each metropolis. The study identified the importance of understanding the unique needs and characteristics of a specific metropolis and outlined the essential characteristics of successful public transportation systems.

KURZFASSUNG

Diese Arbeit gibt Einblicke, wie gut funktionierende öffentliche Verkehrssysteme in europäischen Metropolen etabliert sind. Um die Komponenten und Merkmale zu identifizieren, die ein erfolgreiches öffentliches Verkehrssystem ausmachen, werden in dieser Masterarbeit neun verschiedene öffentliche Verkehrssysteme in neun Metropolen untersucht. Die Analyse dieser Systeme hilft zu verstehen, wie verschiedene Dienstleistungen unter Berücksichtigung individueller Umstände erbracht werden sollten. Diese Arbeit hebt hervor, wie wichtig ein Verständnis der jeweiligen Bedürfnisse in Bezug auf öffentlichen Nahverkehr ist und beschreibt die wesentlichen Merkmale erfolgreicher öffentlicher Verkehrssysteme.

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LIST OF ABBREVIATIONS

AMB	Area Metropolitana de Barcelona
ATM	Autoritat del Transport Metropolità
CD	Cesk Drahy
COMET	Community of metros benchmarking group
CRTM	Consorcio Transportes de Madrid
DPP	Dopravní podnik
EMT	Empresa Municipal de Transportes de Madrid
EMTA	European metropolitan transport authorities
EMV	Europay, MasterCard and Visa
FGC	Ferrocarrils de la Generalitat de Catalunya
GDP	Gross domestic product
GVB	Gemeentevervoerbedrijf
HRT	Helsingforsregionens trafik
HTM	Haagsche Tramweg Maatschappij
km	Kilometer
km ²	Square kilometer
MaaS	Mobility as a Service
PID	Prague integrated transport
PT	Public transport
PTA	Public transport authority
PTRG	Public transport research group
PTS	Public transport system
RATP	Régie Autonome des Transports Parisiens
RENFE	Red Nacional de los Ferrocarriles Españoles

RET	Rotterdamse Elektrische Tram N.V.
ROPID	Regional organizer of Prague integrated Transport
SKM	Szybka Kolej Miejska w Warszawie
SL	Storstockholms Lokaltrafik
TFL	Transportation for London
TMB	Transports Metropolitans de Barcelona
UITP	Union Internationale des Transports Publics
Vkm	Vehicle kilometer
VOA	Vervoerregio Amsterdam
ZTM	Zarzd Transportu Miejskiego
ZVV	Züricher Verkehrsverbund

1 INTRODUCTION

Public transportation is a crucial component of sustainable mobility in European metropolises. This is particularly the case for densely populated areas where public transport has significant direct and indirect effects on quality of life. It serves as an inclusive and widely adopted mode of commuting and reflects the innovation and efficiency with which densely populated regions are managed. There is no single approach on how well-functioning public transportation systems should be implemented. Public transportation is a complex service which is exposed to different positive and negative externalities. Its quality depends on different aspects.

Therefore, this master's thesis aims to analyze various types of data obtained through mixed methods to conduct a comprehensive descriptive analysis and comparison of the transportation systems under investigation. The objective of this descriptive thesis is to serve as a foundational step in understanding the complexities associated with evaluating public transportation systems.

The data utilized for the analysis is sourced from multiple channels, including expert interviews and a comprehensive examination of diverse datasets. These data sources will be consolidated and compared using selected metrics, enabling a comprehensive analysis.

With an abundance of data at hand, the primary goal of this master's thesis is to address the following research questions in a descriptive manner:

- What are the key characteristics of a well-functioning public transportation system?
- Which approaches in terms of organization do the investigated systems follow?
- How common are subsidies in the investigated public transportation systems?
- Are there major differences in the funding of the analyzed systems?
- Can system organizations and funding trends be identified within the comparison group?

By responding to the research questions, an additional conclusionary research question is:

- What are the difficulties and challenges involved in evaluating different public transportation systems?

The thesis is organized as follows. Chapter 2 defines the basic terms and their application in this study, followed by chapter 3 which establishes the theoretical framework which confirms the importance of public transportation, its organizational structures, and various funding mechanisms. In chapter 4, the sample group is explained along with its composition, each metropolitan area, and the existing limitations and biases. A table of input data from each metropolis is provided at the end of this chapter. Chapter 5 presents the methodology and its considerations, including the evaluation of the selected indices. Chapter 6 is an extension of the methodology that describes the qualitative interviews, the questionnaire structure, and the expert pool. Chapter 7 is a critical section of this paper that details the findings, evaluation of the systems based on the selected metrics, and expert interviews. The discussion of findings is presented in chapter 8. Chapter 9 presents an extensive discussion of the limitations, followed by the conclusion in chapter 10. The list of tables, figures, complete literature, and the extensive appendix, including various tables and expert interviews, are also attached.

2 DEFINITION AND APPLICATION OF THE TERMS

In this chapter, the aim is to provide concise and clear descriptions of key words and phrases that are frequently used in the field of study, which may have varying definitions across different research studies. Additionally, the chapter will include a discussion of the application of these terms within the context of the present research.

Public transport system

In this study, the term "public transportation" refers to a transportation system in which public institutions provide funding for operating costs (Trafikstyrelsen, 2020, p. 4). It is an essential element of daily life, especially in metropolitan areas (Matas, Raymond, & Ruiz, 2020), and includes modes of transit such as buses, trams, subways, commuter trains, and trains (Jach, Antony, Thomson, Cudney, & Furterer, 2021, p. 1). Public transportation is normally operated through a partnership between transportation corporations and relevant authorities with funds provided by various public bodies and ticket revenues (Trafikstyrelsen, 2020, p. 6). Public transportation is frequently subsidized in order to reduce congestion and environmental externalities produced by private transportation (Poliak et al., 2017, p. 82). Public and private sectors approach the system's purpose differently, with the private sector focused on maximizing profits and the public sector focusing on promoting social welfare, including equity benefits and accessibility for disadvantaged groups (OECD, 2020a, p. 9).

The following terms will be used synonymously throughout the study: urban transportation, urban mobility service, urban transit system, public passenger transport, and public transport service.

Public transport authority

In this study, a public transportation authority is meant as a government-established agency that is in charge of the planning, development, and management of public transportation services in a certain area (OECD, 2020a, p. 13). The authority is often engaged with working with stakeholders, including private providers, to ensure that public transportation is provided in an effective and efficient way (OECD, 2020a, p. 72). In some circumstances, the authorities may delegate service delivery to private companies while maintaining responsibility for safety and service quality. Regionalization of these responsibilities is becoming more popular in order to better coordinate service delivery beyond municipal or metropolitan boundaries (OECD, 2020a, p. 26).

The following terms will be used synonymously throughout the study: public transport agency, transport authority, coordinating authority, consortium, transport consortium, public transport entity.

Transport provider

Company which runs the public transport service delivery, contracted by another entity or authority. Can be a public, private or a mixed form which delivers the service directly to the customers as e.g. bus company or metro operator. (OECD, 2020a, p. 13)

The following terms will be used synonymously throughout the study: Public transport provider, service provider, public transport service provider, service operators, public transport operators.

European metropolis

With the term European metropolises, the author refers to densely populated urban areas in the European Union plus Switzerland, with a population of at least 50,000 people (OECD, 2020b, p. 4). These metropolitan areas expand beyond city borders to include commuting zones and other functional linkages, reflecting the city's economic and functional realities. Major European cities such as Paris, London, Berlin, and Madrid (which have a large impacts on their respective regions and beyond) are included under this term. (OECD, 2020b, p. 3)

The following terms will be used synonymously throughout the study: metropolitan area, metropolis, city, European city.

Urban area

Urban areas are defined as places with dense populations and high levels of economic and social activity. They are distinguished by increased residential distribution, longer home-work distances, more complex mobility demand patterns, and limited urban space availability. Several indices, including as population density, economic production, and the extent of functional links with neighboring areas, can be used to assess the degree of urbanization. Beyond inner cities, functional urban regions are especially valuable in expressing the economic and social realities of urban life, such as commuting patterns, labor markets, and other functional linkages. (OECD, 2020b, p. 3)

Individual mobility

When "individual car mobility" is mentioned, it signifies that the primary mode of transportation is a personal or private vehicle, such as a car or motorcycle owned or controlled by an individual. It allows individuals to move around independently from one location to another.

The following terms will be used synonymously throughout the study: motorized individual mobility, motorized individual traffic, individual car traffic, individual car mobility, cars.

Operating subsidies

The term operating subsidy refers to financial support provided by the government, either at the state or local level, to a public transport operator to cover some or all of its operating costs (OECD, 2020a, p. 12). It is a payment transfer that does not require a direct exchange of products or services in the market economy (Poliak et al., 2017, p. 87). The subsidy is subject to certain criteria that the public transportation operator must follow in order to receive the transfer (Hörcher & Tirachini, 2021, p. 16).

The following terms will be used synonymously throughout the study: subsidies, public funds, public subsidies.

Modal split

The term modal split refers to the distribution of travel demand among different modes of transportation (e.g., car, public transportation, walking, cycling) in a certain area or population in this study. It is usually obtained by surveys or data gathered on the modes of transportation utilized for a certain set of trips or distances. It can be stated as a percentage of the total number of trips or distance traveled by each mode (Zhou, Chen, & Wong, 2009, p. 1). Modal split is an essential aspect of transportation planning and policymaking because it guides decisions about infrastructure and service investments for distinct modes, reducing congestion, improving air quality, and promoting sustainable mobility (Holz-Rau, Zimmermann, & Follmer, 2020, p. 2).

Pay-as-you-go model

The check-in-check-out system, also known as pay-as-you-go models, represents a novel form of cashless and contactless smart ticketing (Graham & Mulley, 2012). This system can be utilized through different mediums such as smartphones, smart wearables, or smart cards issued by transport authorities or EMV cards (Doynova, 2022). The passenger checks in with their preferred payment method when they board a vehicle or network and checks out with the same payment method when they leave. The fare incurred by the passenger is then automatically deducted from their card (Piacquadio, 2020, p. 8). The tariffing for this system can be based on zone, distance, user type, or time. Additionally, some systems may offer price caps and best fare calculations, which are determined based on the chosen tariffing method. (Piacquadio, 2020)

The following terms will be used synonymously throughout the study: Check-in-check-out system.

Mobility as a Service

Mobility as a Service (MaaS) is based on a variety of travel modes, including private vehicles like cars and bikes, ride-sharing, and public transportation. The objective is to move away from single transport modes towards an integrated mix of different transportation modes (Xi et al.,

2023, p. 2). MaaS systems offer customized travel options to customers by integrating various modes on a digital platform with real-time information and a simple payment system (Xi et al., 2023, p. 3).

3 THEORETICAL FRAMEWORK

The theoretical framework chapter is divided into three parts and covers the fundamental aspects of public transportation systems in European metropolises. The initial section offers a brief introduction that describes the applicability, significance, and qualities of this service. Subsequently, the chapter discusses the core tasks and major organizational structures of public transportation; emphasizing the significance of the service's liberalization, the tendering process, and the various types of contracts. Finally, the chapter provides the underlying theoretical foundation for this study by discussing the funding of public transportation systems.

3.1 Public transport in European metropolises

In this section of the literature review, we will focus on the relevance and importance of public transportation and its key characteristics.

Big cities cannot function without public transportation. Over 75% of citizens from the member countries of the European Union (EU) live in urban areas. Consequently, a sizable portion of overall mobility is accounted for by urban transportation. Urban trips under 15 kilometers in length account for one-fifth of all persons' kilometers traveled in the EU. The total number of kilometers traveled in metropolitan areas of the EU is anticipated to rise by 40% between 1995 and 2030 (M. Müller & Hidson, 2003, p. 3). Public transport is the backbone of urban transportation in densely populated metropolitan area. Individual car mobility will become less appealing due to unavoidable traffic congestion and the difficulty of storing individual vehicles while they are not in use (Hörcher & Tirachini, 2021, p. 1). Beyond only congestions, pollution, noise, and accidents caused by individual car traffic affect the lives of thousands of people. One of the most important factors to consider while developing a sustainable urban environment in metropolitan areas is public transportation. Public transportation provides the best solution for mobility needs in densely populated places and is the most space-efficient mode of transportation overall. (M. Müller & Hidson, 2003, p. 3).

It is important for urban areas to prioritize a high-quality public transport system. Demand for mobility has increased as a result of population growth. But when public transportation networks cannot keep up with the demand, this can result in even more traffic, longer waiting times, and a less attractive public transport system and therefore becoming a less convenient alternative to individual car traffic. It is vital to switch from using private vehicles to using public transportation as well as walking and cycling (Saif, Zefreh, & Torok, 2018, p. 1). When the service provides a higher quality of mobility, people are willing to switch. This is a result of the sensitiveness of costumers. People are more sensitive to the quality of the service then to the fares and prices of the public transportation service (Matas et al., 2020, p. 10).

Public transportation results in a healthier environment for the citizens of the city. Almost 40 million people in the 115 largest cities in the EU are exposed to air that exceeds WHO air quality guidelines, according to the World Health Organization (WHO) (UITP, 2021, p. 2). Public transportation helps to enhance air quality as it generates significantly less air pollution per passenger kilometer than individual motorized mobility. Automatically this would also lead to

less noise pollution (UITP, 2021, p. 5). The environmental goals set by the European Union cannot be met without a mobility shift towards public transportation.

The regulatory environment is the fundamental building block for efficient public transportation. Operators (both private and public) can only develop sustainable transportation networks that can meet future demands in an open and transparent environment (Anreiter, Kampus, Buckridge, & Lightfoot, 2003, p. 7). It is essential to plan and coordinate different modes of transport. Only a well-integrated system, which runs smooth and fast is convenient and attractive to use (Poliak et al., 2017, p. 85).

To summarize, public transportation is an essential service for modern society. Every day, it provides an affordable and accessible mode of transportation for millions of people, reducing traffic congestion, and contributing to pollution reduction. It also helps to promote social inclusion by giving mobility to individuals who do not have access to a car. Furthermore, investing in public transportation infrastructure is critical for long-term urban development, economic growth, and increasing inhabitants' general quality of life.

3.2 Organizational structures in public transportation

This section defines the many forms of public transportation that are utilized and managed. A detailed explanation of the many processes required to facilitate efficient public transportation will be presented. The goal of this section is to increase understanding of the common organizational structures and forms that lead to the delivery of the service.

The management of public transportation service is primarily the responsibility of various governmental organizations. In European Union member states, urban transport refers to the provision of service within cities and inhabited areas, whereas regional authorities generally oversee rural transportation. Public transit services for specific locations are often organized through collaborations between multiple governmental entities. (Poliak et al., 2017, p. 88)

A comprehensive overview of the numerous activities performed by a public transportation service is required before introducing the various organizational structures. The subsequent assignments are taken from Zinsius (2013; p. 13):

- **Strategical planning function:** This involves the development of an overall strategy and plan for public transportation, which includes identifying key objectives and goals.
- **Regulatory function and tendering:** This involves creating a competitive strategy for providing public transportation services, including the process of awarding contracts and tenders, planning and execution of the tendering, budgeting, and contracting.
- **Coordination function:** This function involves ensuring integration of communication and market presence, developing tariff policies, establishing a framework for sales, and integrating timetables for effective service delivery.
- **Marketing and communications:** This involves conducting market research, developing commercialization strategies, planning tariffs, developing communication and

marketing campaigns, and managing customer contact to ensure high-quality service delivery.

- Infrastructure: This involves planning and executing the necessary physical infrastructure for public transportation, which includes designing and building transportation modes such as rail, buses, and other necessary transportation structures.
- Operating functions: This function involves planning and managing the fleet and personnel, scheduling maintenance of vehicles, and ensuring compliance with safety regulations and policies.

These tasks represent the essential responsibilities that must be undertaken by the entities responsible for providing public transportation. To fulfill these tasks, governmental organizations have developed various forms of service organization. In accordance with Zinsius (2013; p. 15), the major types found in European countries are listed below:

- The single-level model: In this traditional municipal model, a single organization is responsible for all tasks related to public transportation, including strategical planning, regulatory function, coordination, marketing and communication, infrastructure, and operating functions. Tendering activities are unnecessary, as the organization is a self-contained municipal agency or a wholly owned subsidiary.
- The two-level model: This model has two levels of hierarchy, with the municipal government responsible for strategical planning, marketing and communication, and regulatory and tendering activities. Private transportation companies are contracted to provide the service on behalf of the planning authority through a tendering procedure.
- The three-level model: This model involves three levels of hierarchy, with one or more governmental entities sitting on top, followed by a management authority; which may be a public transport association. The managerial authority organizes the service based on the objectives stated by the governing bodies and sets up a tendering procedure or direct award for private transportation providers to carry out the service.

These are the most common organizational forms existing in European countries. Most of the large metropolitan areas have a three-level organizational structure. One transport authority is responsible for various municipalities, organizing the public transport for a specific area.

Metropolitan areas take very different approaches to service liberalization. The main reason for allowing private involvement is that it promotes operational efficiency. (Jain, Cullinane, & Cullinane, 2008, p. 1241)

The application of the various tasks greatly depends on the entity. As previously stated, in many nations, public transportation was operated by a single public operator. This led, in many cases, to inefficiency due to an overinvestment propensity, as well as mismatches between offered services and shifting demand levels. As a result, many governments have implemented tendering mechanisms for public transportation, allowing private enterprises to engage. Several experts believe that competition is crucial for the development of public transportation. Competition fosters innovation while also ensuring resource efficiency. The difficulty with private

operators is that they focus on profitable markets while ignoring unprofitable ones. As a result, government regulations as well as subsidies are required. (International Transport Forum, 2008, p. 15)

Public transportation is a service which is strongly affected by the legal frame. Nowadays we have different institutions such as the European Union, the national, regional as well as the municipal government influencing the public transportation service. They lay the foundation of how the service looks like and who is responsible in providing it. (Zinsius, 2013, p. 8)

Public transportation was once, in many European countries, a service provided completely by the national government. By the end of the 20th century the trend was to liberalize and privatize this market. The idea was to make the service more efficient with increasing competition. Many governments have implemented this in different extents. This led to regulations also imposed not only by the various national and regional governments, but also from the European Union. (Button & Costa, 1999, p. 427)

The quality and integration of a transportation service are the most important factors for its attractiveness. In order not to jeopardize this, many operators are still in public ownership. Therefore, especially in many European metropolises, the core network is directly awarded and not tenderized. (International Transport Forum, 2008, p. 16)

The operational integration of the public transportation system is an essential step toward quality. This integration consists primarily of an integrated network layout, as well as well-connected, coordinated, and synchronized schedules between various modes and operators within the public transportation network to guarantee efficient and reliable coverage of the area. Common pricing, as well as a consistent marketing presence and communication with the customer, are required to deliver an easy to understand, complete, and speedy service to the customer (Poliak et al., 2017, p. 88). Integrated fare systems further encourage the usage of public transportation. The majority of fare systems are zone-based. The entire territory is divided into fare zones, with each zone having a unique tariff. An additional charge is imposed when zones are crossed. The transaction and monetary costs of the travel are reduced by using this approach. (Matas et al., 2020, p. 1). This implies that a defined hierarchy and structure are required for the organization of the public transportation system. (Poliak et al., 2017, p. 88) Public authorities use the term "integration" to describe a strategy that ensures a convenient "door-to-door" service. (Poliak et al., 2017, p. 86)

Regulation is a crucial element for the functioning of public transportation. The unique characteristics of this service, including its wide coverage and high accessibility, make it impossible to operate without appropriate regulations in place. (Saif et al., 2018, p. 1)

Many big transport providers in European metropolises are held by governmental institutions due to tradition or history. These businesses are typically given a certain area in which to provide transportation services. Other areas are generally given through a competitive tendering process. This can be explained by evolution within the liberalization process, but it can also be explained by expanding metropolitan areas. Often, areas where the provider is directly awarded are those that require a certain level of stability. The direct awarding process' main advantage is that the running system is not changed. This is optimal for maintaining a stable organizational structure (Zinsius, 2013, p. 9). Tendering can lead to short-term staffing issues. This can occur

when one tender has lost and the new tender is lacking in sufficient drivers. Together with staffing issues for businesses, the working circumstances in a highly competitive industry are not ideal (M. Müller & Hidson, 2003, p. 18). Additionally, this reduces the danger of selecting an operator who may not complete the responsibilities, due to the lack of experience. But, transparency is limited in this circumstance, and efficiency improvement is not assured as it is when the service is tenderized. (Zinsius, 2013, p. 9)

Independently of whether the service is directly awarded or tenderized, the contract is the major element when electing a service operator. It allows the coordinating authority to control the actions of the private operator within a set frame. Two types of contracts are common: gross cost and net costs contracts. Of these two basic types of contracts, mixed forms have been created to establish certain incentives. They differ in the revenue and market responsibility of the companies. (Zinsius, 2013, p. 27)

The gross cost contract consists of a fixed service the operator must fulfill. This can be, for example, a certain amount of vehicle kilometers with certain vehicles. The company gets remunerated independently of how many passengers use the service. Here the provider can work securely and is not really incentivized to improve its service. The transportation authority takes the revenue risk. The gross contract requires detailed specification and monitoring of an explicit performance program.

The net cost contract works differently, here the operator gets a certain subsidy from the transport authority as well as the complete passenger revenue. Consequently, the company has a different approach on market responsibility. The provider bears the revenue risk. Therefore, he is also incentivized to maximize passenger revenue which should result in efficiency. In this case the contract needs to be very complete, otherwise the operator will cut down on non-profitable services, which are crucial to maintain for a complete public transport service. Mostly this kind of contract is applied when the organizational structure allows a certain kind of freedom in managing the business. This varies depending on the case and on the organizational structure. (Zinsius, 2013, p. 29)

In a mixed contract or incentive-based contract, which is the most common one nowadays, the basis is a fixed remuneration by the transport authority plus incentive-based bonus payments; mostly through a bonus-malus system depending on quality criteria. (Zinsius, 2013, p. 28)

Defining and creating a quality-based contracts for the providers is the major task for the transport authorities. Within this contract, all important factors such as vehicle kilometers and the type of vehicle itself (including number of seats, numbers of doors, etc.) are regulated (Müller et al., 2015, p. 15). As mentioned earlier, next to the price, the quality of the public transportation service is the most important reasons for the success of the transportation service. In most of the cases, higher quality results in higher costs, this can be easily explained through the headway, which is the frequency of services during rush hour, for example. Tendering and therefore controlled competition results mostly in resource efficiency and an attractive public transport system. (Zinsius, 2013, p. 30)

The government's primary function is to establish an autonomous transportation entity that establishes the requirements for public transportation in urban regions, particularly metropolitan areas. These authorities must set the requirements and issue tenders. It is critical that they

provide the highest quality transportation service possible within the constraints of the budget. They are also in charge of incorporating social and environmental principles. The service can be established efficiently due to the potential of competitive tendering. These savings can be used to increase the service's quality even more or to lower ticket rates, making the transportation service even more appealing (M. Müller & Hidson, 2003, p. 33).

Many transportation authorities have built systems that assign their services to both public and private companies. Even the coexistence of these mixed forms demonstrates how organizational efficiency might seem. In the case of Barcelona's transportation system, one main operator is in charge of the downtown region, while various private tenders are in charge of the surrounding areas. The public-owned main operator is working more efficiently because it is aware that working inefficiently implies the risks of being contracted out to private operators (Albalade, Bel, & Calzada, 2012, p. 96).

To summarize, a well-structured transport authority is responsible for establishing an integrated public transportation network and selecting the public transport provider through transparent tendering processes result in a high-quality public transportation service. This, in turn, can provide an attractive mode of commuting and a competitive alternative to individual car traffic. It is important to note that each case is unique and systems where providers are directly elected may also have advantages and operate efficiently.

3.3 Funding of public transport systems

The final section of the theoretical framework is to provide a full overview of the many financing mechanisms used in the relevant field, as well as an evaluation of the fundamental reasons and justifications. The goal is an improved understanding of the financial framework.

In many developed nations today, public transit systems are significantly subsidized with the primary goal of promoting increased usage by making it an attractive option in terms of pricing and quality. As previously discussed in earlier sections, municipalities and local governments utilize public transportation systems as a key component of their urban transport strategies; in order to offer an alternative to private car transportation (Matas et al., 2020, p. 1). The benefits of robust urban transportation networks for urban areas are numerous, as discussed in the previous sections of this chapter. Determining the optimal level of subsidization, or even the whole funding structure for public transportation is a complex and multifaceted political issue that cannot be easily defined or quantified. It is contingent upon a range of factors, including pricing policies, quality settings, and other contextual considerations (Hörcher & Tirachini, 2021, p. 16).

In addition to subsidies, public transportation systems generate revenue through various sources, including passenger fares, advertising, and rental income. The actual passenger revenues are influenced by two primary factors: the pricing policy of the transportation system and the number of clients utilizing the service. Determining pricing policies is a complex and multifaceted process, involving considerations such as financial, redistributive, and ideological objectives. These objectives are unique to each public transportation system and dependent on the governmental and company-set strategy for the system. Authorities responsible for setting

prices are cognizant of the impact of different fare strategies on demand management and often use pricing policies to flatten demand, particularly during peak hours. By implementing optimal fares, public transportation systems can better allocate resources, increase efficiency, and internalize external costs and benefits in the users' decision-making process. This can be achieved through a range of pricing strategies (Hörcher & Tirachini, 2021, p. 13).

Studies have shown that an increase in public transportation usage leads to increased revenues. Additionally, increased subsidies have been found to lead to decreased fare levels and increased service quality. Lower fares, in turn, make public transportation more accessible and appealing to low-income populations. (Poliak et al., 2017, p. 87)

Subsidies for public transportation are primarily intended to offset deficits and are typically funded by public funds provided by either the state, local governments, or both, with variations across nations. In many European countries, these funds are derived from general taxes, and public transportation is funded from the same budget as other public services, such as healthcare and education. However, some countries employ unconventional financing mechanisms to support their public transportation subsidies. For instance, France utilizes a specific income tax to finance its public transportation system (Poliak et al., 2017, p. 90). Parking fees can also serve as a direct source of revenue for public transportation funds, in addition to fees for the use of road infrastructure, motor vehicle taxes, income tax, and property tax. (Poliak et al., 2017, p. 91)

In addition to deficit compensation, social policy subsidies contribute to overall public transportation system subsidies. Reduced ticket costs for students or individuals of a specified age are examples of such subsidies. The complexity of these numerous subsidies, however, can make managing them difficult. In some cases, the main goal of constructing an efficient and welfare-maximizing public transportation system may be undermined by these various subsidies and contributions. (Zinsius, 2013, p. 11)

The process of subsidization for public transportation is subject to various economic, political, and geographical factors. Determining the optimal level of subsidies and their relationship to performance must be evaluated on a case-by-case basis (Karlaftis & McCarthy, 1997, p. 387). Some transportation systems adopt a zero subsidy or zero fare model or strive for efficient resource allocation. These approaches are often politically driven and vary between countries. The feasibility and effectiveness of such models depend on a range of economic, social, and political factors, and need to be evaluated on a case-by-case basis. (Hörcher & Tirachini, 2021, p. 22)

There exist various approaches to financing a public transportation system, with pricing policies often being influenced by political, economic, and ideological considerations. In many cases, a price is set to match with political objectives, with subsidies then utilized to cover any remaining costs. Additionally, the responsible authorities will use pricing to manage demand and ensure an efficient and high-quality service. The balance between subsidies and passenger revenues varies across systems, with political goals and economic resources serving as key determinants in this regard.

4 SELECTION AND DESCRIPTION OF METROPOLISES IN STUDY SAMPLE

In this chapter, the composition of the sample and the rationale behind its selection, as well as the specific rules applied to ensure an objective and transparent analysis of diverse public transportation systems in metropolitan areas, will be presented. The complexity of the systems under investigation necessitates the adoption of specific criteria to achieve a neutral and equal investigation of the samples.

It begins by discussing the conditions which governed the selective sampling process, followed by an examination of the potential biases that may have affected the composition of the sample. Subsequently, a detailed description of each metropolitan area included in the sample, including their geographical, political, and organizational characteristics will be provided.

By the end of this chapter, readers will gain insight into the reasons for the selection of certain metropolitan areas and understand why certain biases may persist in the data.

4.1 General conditions of the sample group

The sample for this qualitative investigation is chosen based on specific criteria. The criteria were set both before and during the study process. The emergence of unexpected findings throughout the data collection process led me to update by essential requirements. Finally, a series of requirements was implemented to ensure an independent, diverse, but homogeneous sample group.

It is important to note that this process could lead to biased criteria. This bias will be discussed more extensively detail in Section 4.2.

This study's procedure for identifying the specific conditions for sample selection was designed specifically for this research.

1. Geographical area:

The study was confined to cities within EU member states, plus Switzerland, to ensure a specific geographic focus for the investigation.

2. Relevant metropolitan area:

In order to limit the term metropolitan area and to achieve a homogeneous but still diverse sample group, the following conditions were implemented:

- a. Metropolitan area with more than one million inhabitants:

The goal was to investigate the public transportation systems in highly populated areas. Only areas with at least one million inhabitants were selected. Mostly these areas are accumulations of different municipalities and politically separated areas. Furthermore, these areas are around well-known cities, and the areas are labeled as metropolitan areas. Defining reasonable metropolitan areas to investigate was the most complex and difficult task. Because of the vast disparities

in how cities are organized, as well as the political and administrative implications, a thorough examination of the relevant area is required. Each metropolitan region has its own classification of which areas belong to it and which do not. Furthermore, there are numerous ways to define a metropolitan area and how governments established distinct authorities for different areas.

b. A territory not bigger than 15.000km²:

When examining metropolitan areas, it is crucial not to lose sight of the densely populated area itself. While examining an area, it is important to be aware of what belongs to the metropolitan area and to limit it. Most of the public transportation occurs in and around the examined area's core. The aim is to investigate the area where the relevant public transportation for this metropolitan area is happening. Thus, areas which do not belong anymore to the metropolitan area would alternate the datapoints within the sample group. As a result, implying a space restriction is required. It is fundamental to be aware of the territory and the applicability of the data for this research while evaluating data from authorities and companies. Sometimes these authorities or companies collect data for a much larger or smaller territory. Therefore, it is important to consider only the respective metropolitan area.

c. Maximum of two largest metropolitan areas from one country:

It was also important to populate the sample group with metropolitan areas from various countries. As a result, the first and/or second largest metropolitan areas in one country were analyzed. This consideration was done on the purpose to eliminate a bias based on one country's cultural influence.

3. Transparent organizational structure:

All metropolitan regions under evaluation must provide a clear organizational structure for their public transportation systems. All entities functioning within the system, including planning authorities, controlling authorities, operators, and local, regional, and national governments, must have a clear position within the system, complete with rights, obligations, and tasks. This is an essential requirement to ensure that the data is interpreted correctly. Transparency is also important in terms of how various entities recorded their data and specified which and what information was recorded. Transparency in the public transportation structure is essential for a high-quality analysis.

4. Availability of data:

The most crucial condition is the requirement that data are available and complete. Only available and complete data allow an analysis and comparison of those various systems. Earlier it was mentioned that the rules can hardly be applied individualistically, but more collectively and as an interconnected set of conditions. This is the definitive and primary rule. It is also important to note that only data from the fiscal year 2019 was examined. To provide a reasonably neutral comparison, the fiscal year before the Covid-19 outbreak hit the public transportation industry had to be used. The impact on data, particularly financial data, on companies during and after the Covid-19 crisis was significant.

5. Maximum processing time of 2,5 months:

An approximate time frame of six months is anticipated for this scientific study. The majority of the work should be completed in roughly six months. As a result, data collecting cannot surpass this timeframe. Because of inconsistent and incomplete data, many metropolitan areas will require extra effort. This takes into account waiting time due to time bottlenecks experienced by operating companies and entities. A maximum waiting period of 2,5 months per system was intended for this paper. If an entity does not engage after proactive contact within two and a half months, the metropolitan area is dropped due to insufficient data. Many of the investigated systems have a large part of their data, public, transparent, and understandable available. While requesting data, the average wait time did not surpass one month, which is considered normal.

4.2 Applied rule limitations and possible bias

The data collection process for this study is time-consuming and presents big challenges for data acquisition. The metropolitan areas under consideration have diverse geographical, historical, and political characteristics, making uniform data collection a tough process. As a result of the significant data needs for the research issues under consideration, the sample group may be inherently biased.

When it comes to data availability, not every system under consideration captures all the information needed for an objective comparison. Another issue is that different institutions documented their data in different ways due to cultural and legal differences. Data comparisons are difficult due to changes in category and definition, as well as national differences in firm accounting. When the preceding assumptions are assumed, samples from the sample group are already likely to be biased.

This highlights that the input data from the different investigated metropolises have a significant influence on the findings. It emphasizes that the results obtained through the applied metrics in chapter 5 may not necessarily reflect the actual reality. Therefore, it is crucial to acknowledge that the results should be interpreted with caution and an understanding that they may not fully capture the true state of affairs.

4.3 Investigated samples and final selection

This analysis has considered several metropolitan areas, but only those meeting the requirements were included, namely: Amsterdam, Barcelona, Helsinki, Madrid, Paris, Prague, Stockholm, Warsaw and Zurich. Despite numerous metropolises coming close to meeting the requirements, most were excluded due to a lack of data availability, transparency, or processing time.

The upcoming chapter will provide an overview of the selected metropolitan areas in compliance with the established criteria. The chapter will delineate the geographic boundaries of each

metropolitan area, identify the governing entities responsible for their transportation systems, justify their inclusion in the study, and detail any limitations of the sample group.

This edited map of Europe, based on a raw version of a map (Source: Freepik, 2013), is used to showcase the geographic diversity of the sample group and to provide an overview of the location of the cities analyzed, without implying accuracy or realism.



Figure 1: Investigated Metropolises (Source: Freepik, 2023)

Amsterdam

1. Introduction

The largest city and capital of the Netherlands is Amsterdam. 872.757 individuals call 219 km² of surface their home. It is part of the Nordholland region. Owing to its location close to the sea and its unique historical approach to city planning, Amsterdam has a intriguing mix of modes of transportation with biking and walking accounting for about 50% of all trips.

There are many different interpretations for the metropolitan area of Amsterdam, Groot-Amsterdam to the Metropolregio Amsterdam. For public transportation, Amsterdam is part of the Vervoerregio Amsterdam (VOA). This union represents a number of municipalities that are highly dependent on one another in terms of mobility. In this instance, it may be regarded as a metropolitan area. 1.025km² in area, the Vervoerregio Amsterdam is home to 1.565.759 people. (EMTA, 2019)

2. Organizational structure of the public transportation

As previously stated, Amsterdam is part of the Vervoerregio Amsterdam, an organization comprised of 15 towns surrounding Amsterdam. Since there is a lot of movement of people between various towns, these communities joined together to address the issue of mobility. Moreover, one of its duties is managing public transportation. Hence this organization serves as the coordinating body for these 15 municipalities, including Amsterdam. As a result, rather than focusing primarily on public transportation, the Vervoerregio's goal is to manage and coordinate mobility as a whole, covering various kinds of transportation such as cars, bikes, and pedestrians. It does contract the operators direct trough a tendering process.

In 2019, there were four companies providing public transportation services in the Vervoerregio as a whole. The GVB is the largest operator and is present in Amsterdam. EBS and Connexxion are active in the other parts of the Vervoerregio. (Van der Linden, 2023)

3. Areal limitation and availability of data

In Amsterdam, there are multiple ways to define a metropolitan region. It is evident that the Vervoerregio Amsterdam should be taken into account as the metropolitan region for this study. It manages, oversees, and gathers information about the public transportation. The vast bulk of the documents were also exclusively in Dutch. The authority could be contacted directly to gather all the information required for this investigation. (Vervoerregio Amsterdam, 2020, p. 4)

4. Limitation of data

The Vervoerregio Amsterdam system demonstrates high accuracy in trip registration, although the estimation of total annual passenger numbers proves particularly challenging due to the check-in-check-out mechanism employed. The process involves checking in before boarding a bus, tram, metro, or train to record the date, time, and position, and checking out upon leaving the vehicle to record the same information. Based on the public transportation line utilized and the distance traveled, the cost of the journey is then calculated and charged to the individual. However, a single trip involving the use of bus, train, and metro would result in the registration of three separate journeys for

one passenger. Thus, the determination of passenger numbers is different than in other systems (Van der Linden, 2023). It is important to note that the data provided does not include information on regional trains.

Barcelona

1. Introduction

Barcelona is the second largest city in Spain and capital of the Catalunya region. In 2019, the population of Barcelona was 1.636.762 people (IERMB & AMB, 2020). These inhabitants only live in the municipality of Barcelona, which is relatively small among the cities sampled. It covers a total area of 101,35 km² (Idescat, n.d.). Barcelona is surrounded by numerous other municipalities with a considerable population. This forms the densely populated Barcelona metropolitan area. After Paris, Madrid, the Ruhr area, and Milan, it is the fifth most populous area in the European Union (esa, 2017). As a result, the city, along with the surrounding municipalities, has formed a federation to manage its public administration and services in this area. This area is known as the Area Metropolitana de Barcelona (AMB), and it is made up of 36 municipalities with Barcelona at its center. More than 3.2 million people live in these 36 municipalities alone. (AMB & ATM, 2018, p. 4)

2. Organizational structure

The Autoritat del Transport Metropolità (ATM) plans metropolitan public transportation as a voluntary inter-administrative consortium established by the Catalan government, the AMB, the Barcelona city council, and the Association of Municipalities for Mobility and Urban Transport (AMTU) (ATM, 2021).

Therefore the ATM is in charge of a territory that spans 9068 km² and includes 346 municipalities, including the above mentioned metropolitan area of Barcelona. (Generalitat de Catalunya, 2020, p. 8)

Roughly 70 companies are coordinated by the ATM. The contract itself is closed between the operator and the responsible municipality (Palacin Font, 2023). The TMB (Transports Metropolitans de Barcelona), which handles the metro and bus networks in the metropolitan area, is the largest operator. The TMB is fully owned by the public institution Area Metropolitana de Barcelona (AMB) (TMB, 2019, p. 4). Other major operators are the TRAM, which operates the tram lines in Barcelona, and the FGC (Ferrocarrils de la Generalitat de Catalunya), which operates the suburban trains. Following that, various private urban and interurban operators operate within the ATM territory. The ATM is split into six tariff zones. Out of the six existing tariff zones, the first tariff zone accounts for 79.32% of all ATM movements (Generalitat de Catalunya, 2020, p. 8).

Around 15.000 people from the various companies and institutions are involved in ATM coordination (Palacin Font, 2023).

3. Territorial limitation and availability of data

The Area Metropolitana de Barcelona (AMB) provides concrete and quantitative constraints that represent Barcelona's densely populated metropolitan region. The AMB, however, has no authority over the coordination of public transit in the region. Several

entities coordinate public transportation within the Catalunya region. For each of the four existing provinces, there are four analogous authorities that coordinate public transportation for the many well-populated locations in Catalunya. That is the Autoritat del Transport Metropolità (ATM) in Barcelona. The ATM consults the various municipalities. They are the ones ultimately who are contracting, through divers' methods (direct awarding and tendering), their public transportation operators. Additionally, the ATM is in charge for uniform communication and commercialization as well as marketing. As a result, they also gather summarized statistics for the area. The ATM is characterized by transparency and offers publicly accessible data and statistics for a given year. While information from larger ATM operators, such as TML, is widely available; gathering data from smaller operators poses challenges. As a result, the researched area for the Barcelona metropolitan region is the territory where the ATM is functioning. It completes all the requirements for the sample group by providing consistent and complete data. (Generalitat de Catalunya, 2020, p. 6)

4. Limitation of data

The dataset includes the regional trains.

Helsinki

1. Introduction

Helsinki is Finland's capital city. It has a population of 653.835 persons and a land area of 214 m². Helsinki is the central city in the Helsinki metropolitan region, which includes four municipalities. The Keski-Uusimaa Area encircles the metropolitan region. Helsingforsregionens trafik is the organization in charge of coordinating Helsinki's public transportation (HRT, Helsinki regional transport). The four municipalities of the Helsinki Metropolitan Area and five more municipalities from the Keski-Uusimaa region make up the actual HRT area, where the HRT is currently operational (Valkonen, 2015). This shows that public transportation in Helsinki and its surrounding areas covers a surface area of up to 1968 km² and a population of 1.329.394 people in 2019 (EMTA, 2023).

2. Organizational structure

As previously stated, the public transport authority in charge of coordinating, planning, commercializing, and ticketing is known as Helsingforsregionens trafik (HRT, Helsinki regional transport). This combined local transportation region includes 9 municipalities, including Helsinki. Municipalities as well as various national ministries fund it. The municipalities are split into 4 tariff zones (Valkonen, 2015).

Buses, trams, metro, ferries, and suburban trains are all part of the transportation network.

One of the biggest operators is City Transport Ltd, which is responsible for the trams, metros and ferries as well as the maintenance of the public transport infrastructure (Metropolitan Area Transport Ltd, 2023). Helsingin Bussiliikenne, Nobina Finland Oy, and Pohjolan Liikenne Ab are the major bus operators (HSL, 2023).

3. Territorial limitation and availability of data

In the Helsinki region, the political borders of the metropolitan area and its surrounding region are well-defined. The Helsinki Regional Transport (HRT) is the primary authority responsible for coordinating public transportation for the metropolitan area and surrounding municipalities. Therefore, selecting the HRT's regional transport area as the study area is logical. Other territorial separations were not possible due to a lack of information. The HRT collects data on all public transportation services within their area. Obtaining data from the HRT was only possible through the EMTA, and while some information is available publicly, not all data can be accessed. The available data were compared with the EMTA dataset. (Valkonen, 2015, p. 6)

4. Limitations

It is not possible to say if the data for the regional train is included or excluded in the dataset.

Madrid

1. Introduction

Madrid is the capital of Spain and of the community of Madrid region, which is formed by 179 municipalities (Comunidad de Madrid, 2017). 6.663.394 people live in an area of 8028 km² (Instituto de Estadística, 2023). It is one of Europe's largest metropolitan areas. The city of Madrid, in the center of the region of Madrid, measures 605km² with 3.266.126 inhabitants (Instituto de Estadística, 2023). The metropolitan area has a very centralized approach, meaning everything revolves around Madrid's center.

2. Organizational structure

The public transportation system in the Madrid community is organized by the Consorcio Transportes de Madrid (CRTM), which is a collaborative effort between the Madrid regional administration, 179 municipal governments, and the Spanish Ministry of Public Works. The CRTM acts as the responsible transport authority for the region, with a range of responsibilities including planning the public transportation (PT) infrastructure, coordinating between operators, funding, ticketing, and monitoring the financial management of operators. The final contracting is done by the municipalities. (Consorcio Regional de Transportes de Madrid, 2020, p. 5)

The PT modes available within the region include suburban trains, metro, light rail, and buses. The region is divided into six tariff zones with multiple private and public-private operators within each zone.

The national company Red Nacional de los Ferrocarriles Españoles (RENFE) operates the suburban railways, the Metro is operated by a company owned by the Madrid region, the Lighttrain is operated by three different companies, and buses are operated by either the public operator Empresa Municipal de Transportes de Madrid (EMT) or private operators (up to 31 different private operators). (Consorcio Regional de Transportes de Madrid, 2020, p. 7)

The CRTM compensates all operators for their services and is funded by ticket sales and public contributions from the Autonomous Region of Madrid, national public

administration, and municipalities, primarily the Madrid city council. The distribution of revenue streams to operators varies depending on the operator. (Consorcio Regional de Transportes de Madrid, 2020, p. 9)

3. Territorial limitation and availability of data

Madrid is highly integrated into the Madrid region and the metropolitan area encompasses the entire territory of Madrid. Therefore, it would be impractical and illogical to separate Madrid from the region, as Madrid manages public transportation for the entire area. The coordinating authority is responsible for planning public transportation service as well as managing ticket sales and the funding for the overall transportation service is the CRTM. This authority is known for its remarkable transparency, as evidenced by the wealth of essential information contained in its annual report. In the unlikely event that any crucial information is missing, it could be quickly obtained through the CRTM. Although larger operators have data and figures available, this information is unnecessary as the CRTM can gather all necessary data. (Consorcio Regional de Transportes de Madrid, 2020, p. 5)

4. Limitation of data

The dataset includes the regional trains.

Paris

1. Introduction

Paris is the capital of France and the most densely inhabited city in the Île-de-France region, with 2.165.423 residents in 105,2 km². The Île-de-France region itself has a population of 12.262.544 people on a land area of 12.012km² (Omnîl & Île-de-France Mobilités, 2023). Paris is France's largest metropolitan region and one of the largest in Europe (Brutel, 2011). In the literature there are many different interpretations of what can be considered as the metropolitan area of Paris. When it comes to public transit, the entire Île-de-France region, including Paris, is coordinated by a single transport authority. The authority is the Île-de-France Mobilités and it is in charge of not only public transportation coordination, but also mobility planning in the territory as a whole (Île-de-France Mobilités, 2021). Within the Île-de-France region, mobility is analyzed in 3 areas. In the middle the city of Paris, the close surroundings (called Petit Couronne) and the rest of the region is considered the Grande Couronne. The commuting rate between those areas is very high. The vast majority of rides take place in Paris's outskirts. (Omnîl & Île-de-France Mobilités, 2019)

2. Organizational structure

The Île-de-France Mobilités is in charge of coordinating and organizing public transportation throughout the Île de France region and therefore its transport authority. They oversee developing the public transportation service, contracting the operators, and merchandise sales. It is a body established and funded by the national, regional, and municipal governments. Because of the significant demand for public transportation, the network and service are extensive. The territory is divided into six tariff zones. (Omnîl & Île-de-France Mobilités, 2019, p. 25)

The metro, buses, and trams in Paris are all operated by the Régie Autonome des Transports Parisiens (RATP). The RATP is a state-funded public cooperation (RATP Group, 2023). The regional trains and the RER suburban trains are controlled by the Société Nationale des Chemins de Fer Français (SNCF). The SNCF is owned totally by the French state (SNCF, 2023). Outside of Paris, Optile is in charge of the suburban bus lines.

3. Areal Limitation and availability of data

In a region like the Île-de-France, identifying a suitable metropolitan area for research can be challenging. This is because of the high level of movement occurring within, from, to, and beyond Paris due to its highly centralized approach. However, since Île-de-France region is responsible for public transportation and coordinates and manages the public transportation system within the region, it makes sense to consider the entire region as the metropolitan area for this research. The data collected from Île-de-France region supports the selection of the entire region as the subject of inquiry. There are ample publicly available resources that provide comprehensive information on all modes of public transit. However, the only limitation is that these resources are written in French only. Therefore, direct communication with the authorities may be challenging, especially for those who do not speak French. (Ile-de-France Mobilités, 2020, p. 16)

4. Limitation of data:

Annual traffic is calculated based on the number of vehicles and lines, with metro journeys being counted once, and journeys involving a transfer from metro to bus being counted twice.

Prague

1. Introduction

Prague is the capital city of Czech Republic. The city measures 496 km² and 1.324.277 people lived there in 2019. Prague is located in the heart of the central Bohemian region. The public transportation system is organized around the city of Prague and its neighboring areas. This is known as the Prague Integrated Transport (PID) zone. It is not a political area. The Czech authorities decided to establish this territorial area in order to coordinate public transportation by the two responsible authorities ROPID (Regional Organizer of Prague Integrated Transport), the transport authority of the city of Prague and the IDSK (Integrovaná doprava Středočeského kraje), the transport authority of the region of central Bohemia. The objective is to create a reliable, simple-to-use, integrated public transportation system for this heavily traveled area (ROPID & PID, 2019, p. 4). This area has a size of 8.312km² and is home of 2.611.023 people (EMTA, 2023).

2. Organizational structure

The public transportation system is overseen by the ROPID and the IDSK, as previously stated. Both coordinate and manage the public transport service in the established Prague integrated transport area.

This territory is divided into nine tariff zones, with Prague at the center (ROPID & PID, 2019). The ROPID and IDSK coordinate up to 20 operators. The operator responsible for the metro, busses and tram in Prague is called Dopravní podnik (DPP). The suburban train for Prague and its surroundings is operated by the state-owned train company Česká dráha (CD). Furthermore there are 18 private operators responsible for the suburban area (EMTA, 2015).

3. Territorial limitation and availability of data

For this study, investigating a metropolitan region is limited to the PID area designated by the transportation authorities, despite its low population density. This is due to the scarcity of information available outside this region. Therefore, the PID region is considered as the metropolitan area for this research, as there is sufficient information available within it. Sufficient information was compiled from the EMTA database to analyze the public transportation system in the PID area. (ROPID & PID, 2019, p. 5)

4. Limitation

Due to the unavailability of publicly accessible data, information regarding this metropolitan area was obtained solely from the EMTA.

Stockholm

1. Introduction

The capital of the Scandinavian state of Sweden is Stockholm. It is quite densely populated, with 974.073 residents in 2019 living in a total area of 187,2. Stockholm is a part of the region of Stockholm, called Stockholm's län. Stockholm's län measures 6.513,23 m² and is home to 2.377.081 people (EMTA, 2023).

The Stockholm region is fast growing and the relevant authority, the traffic committee, (or Trafikförvaltningen in Swedish) organizes the public transportation system for this region. The region includes 26 municipalities, which are also served by the public transportation system (Trafikförvaltningen, 2018). The regional government claims that it has one of the best public transit systems in the entire EU. On top of that, they emphasize their high level of coordination among firms to provide efficient commuting travels for workers. They claim also to have one of the world's leading systems in terms of sustainability; as its metro, suburban, and regional trains run on renewable energy. They also give great importance to client security. (Region Stockholm, 2021)

2. Organizational structure

Responsible for the strategic planning of the public transport within the region of Stockholm is the Trafikförvaltningen, a traffic committee set up by the region of Stockholm, to coordinate, plan, and commercialize the public transport offerings. There are three operators who are coordinated by the traffic committee and therefore responsible for providing the service. The Storstockholms Lokaltrafik (SL), is responsible for the metro, busses, suburban train and regional trains. The Waxholmsbolaget provides a boat and ferry service for connecting certain islands within the Stockholm area to another or to the mainland. The Färdtjänsten, which is a special service for people with disabilities; so it is not technically an operator of public transportation. (Trafikförvaltningen, 2018)

3. Areal limitation and availability of data

The selection of a metropolitan area for the city of Stockholm is straightforward, as the Stockholm region identifies itself as such. Therefore, for the purpose of this study, the area of Stockholm was considered the Stockholm metropolitan area. Furthermore, the regional government is responsible for planning public transportation throughout the region, including Stockholm. The regional transportation authority collects and manages transportation-related data. However, obtaining the necessary data can be challenging as not all information is publicly available and the available data is mostly in Swedish. To supplement these resources, data from the EMTA database could be collected and compared to our findings. (SL, 2023)

4. Limitation of data

Some of the data may not have been fully recorded and, as a result, it was not possible to conduct a comprehensive comparison using both our own findings and the EMTA database. Additionally, certain pieces of information may be missing from the available data.

Warsaw

1. Introduction

Warsaw is Poland's capital and largest city. The principal city has a population of 1.790.658 people and covers an area of 517 km². It is located in the center of Poland's east in the Masovian Voivodeship (EMTA, 2023).

Zarząd Transportu Miejskiego (ZTM) is the name of the public transportation authority that coordinates its service for Warsaw and the 33 communities surrounding it. The authority serves 2.680.771 people and covers an area of 2884 km². (ZTM & L. Peczyński, 2020)

2. Organizational structure

The Zarząd Transportu Miejskiego (ZTM) is the responsible authority for coordinating, planning, and commercializing the integrated public transport system. The ZTM operates a huge network of buses, trams, suburban trains (Szybka Kolej Miejska w Warszawie, SKM), and metro lines in 34 municipalities. There are only two tariff zones inside the ZTM network, one for Warsaw and one for the surrounding areas. (ZTM & L. Peczyński, 2020)

3. Territorial limitation and availability of data

Politically, there are no official metropolitan areas or regions in the city of Warsaw and the surrounding Masovian Voivodeship region. However, the ZTM (Warsaw Public Transport Authority) network connects major Warsaw suburbs to the city's public transportation system. Therefore, it is suitable to consider the ZTM area as the metropolitan area for investigating the Warsaw case. To ensure accuracy and minimize gaps and errors within the dataset, the data was compared to the EMTA database. (ZTM & L. Peczyński, 2020, p. 6)

4. Limitations

It is unclear if the ZTM dataset includes data from regional trains within their designated area, as there is no apparent distinction between such data is present.

Zurich

1. Introduction

Zurich is Switzerland's largest city, with a population of 419.012 inhabitants in 2019 and a land area of 91,9 km². Zurich is the capital of the same-named canton. The canton of Zurich is Switzerland's most populous and, in compared to other regions of the country, the most densely populated one. (Stadt Zürich, 2023)

This is also an explanation for the considerable movement in this environment. For a study on public transportation, this makes it quite intriguing. Hence, the entire canton of Zurich is examined. Over an area of 1.839km², Zurich is made up of 160 municipalities. The population of is 1.536.406 in total. (ZVV, 2020)

2. Organizational structure

The Züricher Verkehrsverbund (ZVV) is the responsible transport authority and therefore in charge of overseeing and coordinating public transportation in the canton of Zurich. The territory is separated into 8 different companies responsible to then manage, individually and in closer collaboration, the service within the territory. The service may ultimately be provided by up to 37 distinct businesses (ZVV, 2023a). The ZVV plans and coordinates the operation of the transportation network, establishes tariffs, enters into agreements with operators, contracts them, markets the system, and sells tickets. The area is separated into 5 tariff zones (ZVV, 2023b).

3. Territorial limitation and availability of data

Given the compact size of the canton and the absence of a larger Zurich metropolitan area, it is reasonable to focus our analysis on the canton of Zurich. Despite its relatively high population density for Switzerland, areal limitations are apparent. Nevertheless, the Zürcher Verkehrsverbund (ZVV) demonstrates a commendable commitment to transparency and data accessibility. Comprehensive information about the ZVV's operations and data structure was readily available. Though a few details were initially absent, direct communication with the ZVV quickly resolved any gaps in information. (ZVV, 2023a)

4. Limitation of data

The data provided does include regional trains.

4.4 Table of input data

This section will provide the complete datasets for each selected metropolitan area. It will explain the reasons for their composition and provide the sources of data. Based on the selected metrics, which will be outlined in chapter 5, a table was composed of uniform input data from each sample. The following table 1, contains data from each selected metropolitan area and serves as an overall and complete listing of data, forming the basis for the evaluation in chapter 5.

Data collection was conducted in various ways with most of the data being extracted from official sources, including information published by the responsible authorities, operators, and institutions themselves. This included mainly annual reports and other kinds of reports, such as balance sheets, statistics and other types of documents published by responsible public entities. In other cases, the data was obtained through official websites or direct contact with the responsible authority. In some cases, the data could only be obtained through the EMTA database, which is an association of various public transport authorities, which obtains a majority of the needed numbers.

All data points are absolute numbers from the entire year of 2019. Some sources are from previous or subsequent years, but it has always been ensured that the sources contain valid and relevant data for the analyzed year of 2019. The EMTA database was primarily used as a reference to recognize the reliability of the data, both ways. In most of the cases, the data was identical, with small differences occurring due to different ways of collecting data and different categorizing and labeling of data. This data limitation will be further discussed in the final limitation chapter of this study.

It is important to note that the following data is not considered to be complete in any case but rather the most feasible collection of data conducted by the author to the highest degree of accuracy and consistency possible.

To conduct an analysis and an objective overview, certain data points were put together to make the dataset more uniform and comparable. Data points such as total lines, network extensions (km), total vehicle km, total vehicles, and average vehicle km were summed up from different vehicle types and transport modes, including metro-, bus-, tram-, and ferry networks.

This also applies to the data points of total costs, other operating revenue, passenger revenue, operating subsidy, and deficit or profit. It is always assumed as a totality of the data within the investigated public transport system.

The first section (colored blue) of data points outlines the general information of the investigated metropolitan area, including the relevant area examined, the number of people served, as well as the motorization rate per 1000 people and the modal split within the metropolitan area. The modal split is always considered as a whole from the investigated area, and only the different modes, in case it was separated in the original data, were summed up to obtain the final differentiation of the three different models. The modal split was separated into motorized vehicles, such as cars and motorcycles, public transportation, and alternative forms of transportation such as walking, biking, or others.

The second section (colored red, green and grey) consists of data points on total costs, other operating revenues, passenger revenues, operating subsidies, and deficit or profit, which are absolute data points taken directly from the authorities or the EMTA database. These datapoints are summarized numbers by the responsible authorities.

The third section (colored in yellow) of the table consists of data points on total lines, network extension, total passengers, vehicle km, total vehicles, passenger km traveled, employees, and the average fleet age. It is important to note that these data points reflect the various vehicles and networks as a whole. A separation in all cases would lead to a better explanation and comparison of public transportation service in each metropolitan area, but due to the lack of data, this was not possible, and an overall total number had to be used. Several data points, including deficit or profit, passenger km, employees, and average fleet age, are included in this table despite their absence for some cities. This decision was made to provide a more comprehensive understanding of those cases.

It is important to mention that all datapoints regarding currency have been converted to EURO (€) applying the correct currency exchange rate for the year of 2019. In case data was used from the EMTA database, currencies have been already converted.

Overall relevant limitations regarding the data collection process can be found in the limitation chapter.

Non-crucial datapoints for the analysis, but still valuable to have, such as GDP per capita or the motorization rate, may not be included, due to lack of data, for certain metropolises.

To ensure the highest level of accuracy, certain numbers were specified with decimal places. Consequently, the numbers of the other samples were adjusted to match this format. If decimal places were not provided for any data point in the samples, they were not utilized.

The sources used for each chosen metropolis are listed in Appendix A.

Below you will find the relevant table of input data (Table 1)

Metropolis	Amsterdam	Barcelona	Helsinki	Madrid	Paris	Prague	Stockholm	Warsaw	Zürich
territory area PTS (km²)	1,025.00	9,068.00	1968.00	8,028.00	12,012.00	8,319.00	6,513.83	2,884.00	1,839.00
main city area (km²)	219.00	101.35	214.00	605.00	105.40	496.00	187.20	517.00	91.90
inhabitants PTS	1,565,759	5,838,310	1,329,394	6,663,394	12,262,544	2,611,023	2,377,081	2,680,771	1,536,406
inhabitants main city	872,757	1,636,762	653,835	3,266,126	2,165,423	1,324,277	974,073	1,790,658	419,012
population density PTS	1,527.57	643.86	675.51	830.02	1,021.00	313.86	365.00	929.53	835.00
motorized vehicles / 1000 people	387	442	486	583	384	661	394	707	471
modal split									
---% car/motorcycle	38%	36%	39%	39%	35%		40%	35%	57%
---% public transport	16%	17%	22%	24%	22%		30%	40%	32%
---% bike/feet/rest	46%	46%	40%	37%	43%		30%	25%	9%
GDP / capita	€ 34,300.00		€ 60,581.00	€ 36,206.00	€ 60,265.00	€ 29,920.54	€ 64,831.00	€ 31,833.75	€ 90,855.00
total costs	€ 626,000,000.00	€ 1,944,000,000.00	€ 735,300,000.00	€ 2,404,803,066.54	€ 10,351,000,000.00	€ 823,529,411.76	€ 2,044,000,000.00	€ 650,890,000.00	€ 916,426,876.00
other operating revenue		€ 57,230,000.00	€ 17,100,000.00	€ 17,295,716.75	€ 271,000,000.00		€ 377,000,000.00	€ 18,960,000.00	€ 109,216,150.00
passenger revenue	€ 411,000,000.00	€ 839,670,000.00	€ 383,100,000.00	€ 1,019,845,582.71	€ 3,872,000,000.00	€ 168,627,450.98	€ 834,000,000.00	€ 210,220,000.00	€ 494,394,097.00
operating subsidy	€ 215,000,000.00	€ 897,436,000.00	€ 348,100,000.00	€ 1,392,381,903.57	€ 6,751,000,000.00	€ 654,901,960.78	€ 886,000,000.00	€ 421,710,000.00	€ 312,816,629.00
deficit or surplus				€ 54,477,975.44	€ 543,000,000.00				
total lines	115	900	327	696	2,889	555	519	378.00	428
network extension (km)	1,352.00	17,707.00	2,901.70	23,585.02	51,857.00	4,955.00	9,694.00	2,440.50	4,851.00
total passengers	327,800,000	1,272,645,000	396,931,000	1,600,700,000	4,679,590,000	627,330,000	865,000,000	1,201,651,189	674,000,000
total vehicle km	73,000,000.00	431,700,000.00	117,990,000.00	623,300,000.00	502,418,000.00	214,360,000.00	254,664,552.00	268,490,065.28	89,160,000.00
passenger km	1,500,000,000		2,632,121,000		34,036,020,000		6,327,000,000		3,890,000,000
total vehicles	1,138	4,652	1,769	6,780	12,549	3,727	3,109	2,680	2,362
employees		15,326		24,000.00			20,000		9,754
average fleet age (years)	12.00	9.63	14.33	11.02	22.73	12.04		11.50	8.00

Table 1: Input data

5 METHODOLOGY

This chapter explains the master's thesis research design with a focus on understanding the relevance of the chosen qualitative mixed methodology approach. It emphasizes the descriptive purpose, underlying the research design. First, the research goal will be established. Following that, the research design will be outlined in order to justify which research design is most suited for this study. Together with the expert interviews outlined in the next chapter, the findings from both sources will collectively address the research questions and form the mixed methodology approach. For the sake of clarity, the expert interviews are presented separately in the next chapter.

5.1 Object of research

This master's thesis will descriptively analyze various public transportation systems in European metropolises. The goal is to examine different public transportation systems to identify patterns, detect trends and explain why certain systems show differences in given settings. By the end of the thesis, various limitations will be uncovered which can appear when comparing and interpreting different systems.

Many comparisons of public transportation systems have been made, such as Hilmola (2011), Abreha (2007), Georgouli, et al. (2022), The International Association of Public Transport (2008), Button & Costa (1999), Boitani et al. (2013), McKinsey & Company (2021), Boitani & Cambini (2006), Karlafits & McCarthy (1997), to mention a few. Only a small percentage of them take into account the numerous backgrounds and situations in which these systems are operating. Furthermore, an objective analysis on behalf of selected indicators is non-existent.

As a result, the purpose of this study is to standardize different public transportation systems from European metropolises in terms of initial situation, evaluate them to one another, rate them, and describe the findings and disparities between them. As a result, indicators from several previously published research papers, as well as from the author, will be utilized. These selected indicators will help to understand the differences or similarities of the systems and the approaches they follow. The major goal will be to identify disparities in the existing systems and try to describe why these are and what impact they might have.

5.2 Research design

This chapter will provide an overview on the basic methodology for approaching the research questions, the dataset research procedure, and the composition of the indicators to analyze and describe the systems.

5.2.1 Qualitative mixed research

The decision was made to adopt a qualitative mixed research method to address the research questions that were provided in the introductory chapter. This decision can be supported by the fact that each system must first be thoroughly investigated in order to undertake descriptive analysis. Cultural, economic, geographic as well as political factors may have an impact on the dataset, as previously mentioned. Hence, relying only on data may not be sufficient. Also, it is simpler to comprehend some patterns and differences with a larger insight of the systems.

Understanding complex systems and describing them to one another will be made easier by the applications of a qualitative mixed research design. This consists of the methodology based in this chapter as well as the conduction of expert interviews, outlines in the next chapter.

5.2.2 Meta-analysis of selected metrics to evaluate public transportation systems

A valid dataset that permits an objective comparison, has been produced thorough the study. This was made possible through a meta-analysis on how to measure public transport systems.

The meta-analysis made it possible to combine several indicators from earlier studies in order to analyze transportation networks in a way that already previous studies used. A set of indicators has been obtained after examining numerous studies. A final set of indicators has been created by summarizing the results from the meta-analysis.

The literature for the meta-analysis was selected using a systematic review process that involved searching for specific keywords on different search engines. The keywords used for this literature review included terms such as "best practice public transport," "public transport EU," "comparison of public transport systems," and "performance indicators public transport." Only peer-reviewed papers were included to ensure high-quality publications. The list of keywords presented here is not exhaustive and only represents the major ones used. Up to 50 different keywords in different combinations were used. Additionally, the review process included searching through the reference lists of relevant publications and considering selected publications from various associations of public transportation, such as COMET, UITP, EMTA, and PTRG. The databases used for the search included Proquest, Google Scholar, U:search, and regular Google. Over 60 studies were identified and used for the meta-analysis.

The studies which were used to conduct the meta-analysis can be found in Appendix B.

The required data for each public transportation system could be determined based on the meta-analysis results. A uniform dataset from diverse public transportation systems had to be obtained during the data collection procedure. As a result of the missing data, several performance measures were canceled, because they were not collected by the majority of public transport systems. Several were added to the final list, while some were removed owing to repetition.

Several steps were undertaken to derive the final list of performance metrics for evaluating public transportation systems:

1. Relevant metrics were identified through a meta-analysis of literature, which can be found in the table 7. This table can be found in appendix C.
2. To filter out the most significant metrics, metrics that were mentioned at least two studies were taken. These metrics are highlighted in yellow in the table 7.
3. The final selection of metrics identified during the meta-analysis is presented in the first column of the second table 8. Table 8 can be also found in appendix C. This selection of metrics formed the basis for identifying relevant data.
4. The second column of the same table (table 8) displays feasible metrics after the comprehensive data collection process, which eliminated difficult-to-collect metrics. The data collection process revealed that certain information was not available, which was a significant limitation.
5. The author added some performance metrics to the list based on knowledge collected during the data collection process and the literature review, as seen in column 3 of table 8. The objective was to create new metrics based on the existing data to better understand the public transportation system.

The final column displays the comprehensive list of metrics which includes those from the second column, and the author added metrics from the third column of table 8. This is the final list of metrics that was applied for the data collected in chapter 2.

5.2.3 Ranking and categorizing of selected metrics

The final set of metrics will be sorted in this unit based on the authors relevancy.

The measurements are divided into groups so that an organized examination of the various public transportation systems can later take place. The author himself performed the separation following Cruz, Barata and Ferreira (2012), a study which performed a comparable distinction process. Table 9 contains the final selection of metrics sorted by category in appendix C. The yellow marked fields label the category, while the fields below in white contain the assigned metric. Metrics are sorted by general topics such as: cost impact (table 2), financial efficiency (table 3), resource efficiency in mobility (table 4), importance and impact of subsidies (table 5) and mobility (table 6).

5.2.4 Application of the metrics

In this chapter, the metrics selected in the previous process are applied to the nine metropolises outlined in Chapter 4.

The data used for this calculation comes from table 1 (Input data) in Chapter 4. The metrics are presented in five tables sorted by categories, as explained in Chapter 5.2.3. The metrics are self-explanatory and describe the formula applied. After each metric is applied, a ranking of the metric in descending order is presented in the next column, enabling a comprehensive comparison of the metropolitan areas. If a datapoint from one city is missing, it was not included in the ranking because it was not calculated.

cost impact												
metropolis	total costs / total passengers	rank	total costs / inhabitants	rank	total costs / lines	rank	total costs / vehicles	rank	total costs / vkm	rank	passenger revenue / total passenger	rank
Amsterdam	€ 1.91	3	€ 399.81	5	€ 5,443,478.26	1	€ 550,087.87	3	€ 8.58	3	€ 1.25	1
Barcelona	€ 1.53	5	€ 332.97	7	€ 2,160,000.00	6	€ 417,884.78	4	€ 4.50	6	€ 0.66	6
Helsinki	€ 1.85	4	€ 553.11	4	€ 2,248,623.85	5	€ 415,658.56	5	€ 6.23	5	€ 0.97	2
Madrid	€ 1.50	6	€ 360.90	6	€ 3,455,176.82	4	€ 354,690.72	7	€ 3.86	7	€ 0.64	7
Paris	€ 2.21	2	€ 844.12	2	€ 3,582,900.66	3	€ 824,846.60	1	€ 20.60	1	€ 0.83	4
Prague	€ 1.31	8	€ 315.40	8	€ 1,483,836.78	9	€ 220,963.08	9	€ 3.84	8	€ 0.27	8
Stockholm	€ 2.36	1	€ 859.88	1	€ 3,938,342.97	2	€ 657,446.12	2	€ 8.03	4	€ 0.96	3
Warsaw	€ 0.54	9	€ 242.80	9	€ 1,721,931.22	8	€ 242,869.40	8	€ 2.42	9	€ 0.17	9
Zürich	€ 1.36	7	€ 596.47	3	€ 2,141,184.29	7	€ 387,987.67	6	€ 10.28	2	€ 0.73	5

Table 2: Cost impact metrics

financial efficiency								
metropolis	revenue passenger / total costs	rank	operating subsidy / total costs	rank	total revenue / total costs	rank	other revenues / total costs	rank
Amsterdam	65.65%	1	34.35%	8	100.00%	5	0.00%	8
Barcelona	43.19%	4	46.16%	6	92.30%	6	2.94%	3
Helsinki	52.10%	3	47.34%	5	101.77%	3	2.33%	6
Madrid	42.41%	5	57.90%	4	101.03%	4	0.72%	7
Paris	37.41%	7	65.22%	2	105.25%	1	2.62%	5
Prague	20.48%	9	79.52%	1	100.00%	5	0.00%	9
Stockholm	40.80%	6	43.35%	7	102.59%	2	18.44%	1
Warsaw	32.30%	8	64.79%	3	100.00%	5	2.91%	4
Zürich	53.95%	2	34.13%	9	100.00%	5	11.92%	2

Table 3: Financial efficiency metrics

resource efficiency in mobility						
metropolis	vkm / vehicles	rank	total passenger / vehicles	rank	total passenger / vkm	rank
Amsterdam	64,147.63	6	288,049.21	3	4.49	3
Barcelona	92,798.80	2	273,569.43	6	2.95	7
Helsinki	66,698.70	5	224,381.57	8	3.36	6
Madrid	91,932.15	3	236,091.45	7	2.57	9
Paris	40,036.50	8	372,905.41	2	9.31	1
Prague	57,515.43	7	168,320.36	9	2.93	8
Stockholm	81,912.05	4	278,224.51	5	3.40	5
Warsaw	100,182.86	1	448,377.31	1	4.48	4
Zürich	37,747.67	9	285,351.40	4	7.56	2

Table 4: Resource efficiency in mobility metrics

importance and impact of subsidies								
metropolis	operating subsidy / passenger	rank	operating subsidy / inhabitants	rank	operating subsidy / vkm	rank	operating subsidy / total revenue	rank
Amsterdam	€ 0.66	7	€ 137.31	9	€ 2.95	6	34.35%	8
Barcelona	€ 0.71	6	€ 153.72	8	€ 2.08	8	50.01%	5
Helsinki	€ 0.88	4	€ 261.85	3	€ 2.95	5	46.52%	6
Madrid	€ 0.87	5	€ 208.96	5	€ 2.23	7	57.31%	4
Paris	€ 1.44	1	€ 550.54	1	€ 13.44	1	61.97%	3
Prague	€ 1.04	2	€ 250.82	4	€ 3.06	4	79.52%	1
Stockholm	€ 1.02	3	€ 372.73	2	€ 3.48	3	42.25%	7
Warsaw	€ 0.35	9	€ 157.31	7	€ 1.57	6	64.79%	2
Zürich	€ 0.46	8	€ 203.60	6	€ 3.51	2	34.13%	9

Table 5: Importance and impact of subsidies metrics

mobility												
metropolis	vehicles / lines	rank	total passenger / inhabitants	rank	modal split public transport	rank	motorized vehicle / 1000 people	rank	network extension (km) / territory area	rank	total passengers / population density	rank
Amsterdam	9.90	1	209.36	9	16%	7	387	8	1.32	7	214,589.22	9
Barcelona	5.17	8	217.98	8	17%	6	442	6	1.95	4	1,976,571.27	4
Helsinki	5.41	7	298.58	5	22%	5	486	4	1.47	6	587,606.24	8
Madrid	9.74	2	240.22	7	24%	4	583	3	2.94	2	1,928,509.65	5
Paris	4.34	9	381.62	3	22%	5	384	9	4.32	1	4,583,339.86	1
Prague	6.72	4	240.26	6			661	2	0.60	9	1,998,740.83	3
Stockholm	5.99	5	363.89	4	30%	3	394	7	1.49	5	2,370,328.55	2
Warsaw	7.09	3	448.25	1	40%	1	707	1	0.85	8	1,292,748.25	6
Zürich	5.52	6	438.69	2	32%	2	471	5	2.64	3	806,743.79	7

Table 6: Mobility metrics

6 QUALITATIVE INTERVIEWS

The expert interviews are introduced in this chapter. It outlines why expert interviews were chosen, the structure of the interview questionnaire, and the pool of experts, before concluding with the interview evaluation.

6.1 Introduction

As already outlined in the methodology chapter, the research design of this study is a qualitative mixed one. Due to the high complexity of the investigation of public transportation systems, conducting expert interviews is a great tool to gain deeper understanding of the characteristics and challenges of various transportation systems. Interviews supplement the numeric data in Chapter 5 by offering qualitative insights, contextual information, participant opinions, and a deeper understanding of the subject matter. Especially when discussing organizations in which politics and history play a significant role. The interviews help to provide a thorough descriptive analysis.

6.2 Questionnaire structure

The interview guide is designed to ensure a fluid and adaptable discourse. The questions in this interview guide are semi-structured and cover the main subjects in general, but they also allow to understand the context of the systems and to get an insight of information which is not covered by the data outlined in chapter 5. The questions allow the participants not only to speak in the name of their authority, but also to bring in their own thoughts and experiences.

The questionnaire can be found in appendix D.

6.3 Pool of experts

The pool of experts was defined by approaching each responsible authority of the investigated transportation system. Potential interview partners were contacted through email. The final selection was based on willingness and availability to participate in this interview. From the 9 investigated metropolitan areas introduced in chapter 4, the responsible authorities were requested to participate with one expert, as well as one expert from the EMTA. The final list, sorted according to the interview order, of the interview partners is listed below:

- Thomas Kellenberger, head of corporate communications and deputy director, ZVV (Züricher Verkehrsverbund)
- Lluís Alegre Valls, director of the mobility department, ATM (Autoritat del Transport Metropolità de l'àrea de Barcelona)
- Alexandre Santacreu, president, EMTA (European Metropolitan Transport Authorities)

- Ingrid de Bruijn, deputy manager of the contracting department and strategic advisor, Vervoerregio Amsterdam

6.4 Interview evaluation

The interviews were conducted via videoconference and were recorded for later transcription. The audio recordings were transcribed and can be found in the appendix E and F. Two of the four interviews were conducted in English, while the remaining two were conducted in German (with Thomas Kellenberger from ZVV) and Spanish (with Lluís Alegre Valls from ATM), respectively. The goal of using different languages was to get the participants to respond in the most precise way possible. The translation process was carefully conducted with the assistance of Open AI Chat GPT, which was supervised and monitored by the author to ensure accuracy, faithfulness, and correctness. For maximum transparency, both the original language versions and the English translations can be found in the appendix. The transcription of the two interviews conducted in German and Spanish can be found in chapter F. The other two conducted in English as well as the translation of the ones conducted in German and Spanish are available in appendix E. The transcription leaves out irrelevant segments, such as small talk in the introduction and at the end of the interview. It commences where the pertinent conversation for the study, as perceived by the author, commences. Also, the transcription is a word-to-word transcription. Therefore, it can contain certain grammatical mistakes. Only word repetitions are corrected, with the goal to achieve a better reading flow. The transcription is a verbatim representation of the recorded conversation. The results obtained from the interviews, along with the analysis of various metropolises based on the metrics applied in chapter 5.4, are presented in the findings.

7 FINDINGS

This chapter describes the key findings which aim to address the research questions introduced in the first chapter.

Using the qualitative mixed methodology, as described in Chapter 5, the findings will be analyzed descriptively and categorized into two main groups: data generated by the system evaluation based on selected metrics and the data obtained through expert interviews. The metrics were already separated into 5 groups in chapter 5.4. The evaluated systems will be described in these groups. The expert interviews were evaluated into 4 categories, which derived from the research questions as well as the questionnaire. A comprehensive discussion of the findings is presented in Chapter 8.

7.1 Descriptive analysis of the evaluated public transportation service through selected metrics

As previously mentioned, chapter 5.4 categorizes the findings to provide a more comprehensive description of the metrics. When referring to a city name, it refers to the transportation system responsible for the area as described in chapter 4. Each indicator will be addressed while presenting the findings, with a focus on clustering cities with similar results. Clustering is done to facilitate the consideration of the data, without any strict rules. Cities with similar numbers will be grouped together, on behalf of the author. Different trends and clusters can be recognized among the various entities in the sample group.

Cost impact (table 2): total costs / total passengers, total costs / inhabitants, total costs / lines, total costs / vehicles, passenger revenue / total passenger

When examining the different metrics presented in the table 2, it becomes evident that there are distinct clusters of cities. The total costs per passenger range from €0.54 in Warsaw to €2.36 in Stockholm, while the costs per inhabitant are highest in Stockholm (€859.88) and lowest in Warsaw (€242.80). Amsterdam has the highest costs per line (€5,443,478.26), while Prague has the lowest (1,483,836.78€). Paris has the highest costs per vehicle (€824,846.60), whereas Prague has the lowest (€220,963.08). The cost per vkm (vehicle kilometer) ranges from €2.42 in Prague to €20.60 in Paris. Amsterdam is the metropolis where passenger revenue / passenger ranks the highest (€1.25) and Warsaw ranks lowest (€0.17). Warsaw and Prague appear to have the lowest costs in relative numbers in terms of passenger, inhabitant, per vehicle, and line. Conversely, Amsterdam, Stockholm, and Paris have higher relative costs. Paris has the highest costs per vehicle and vkm, Amsterdam has the highest costs per line, and Stockholm has the highest costs per passenger and inhabitant. Amsterdam and Stockholm are also metropolises where the revenue per passenger created is the highest. Barcelona, Madrid, Helsinki, and Zurich are situated between the two extremes. Zurich has greater variation in relative costs than the other three cities, with relatively low costs per passenger but higher costs per population. The relative costs per vehicle and line are relatively low but high in terms of vkm.

In terms of total costs per passenger, the top-ranking metropolises are Stockholm (€2.36) and Paris (€2.21), followed by Amsterdam (€1.91), and Helsinki (€1.85). Barcelona (€1.53) and Madrid (€1.50) are situated below them, while Zurich (€1.36) and Prague (€1.31) are ranked next. Warsaw is ranked last with a total cost of €0.54 per passenger.

Similarly, looking at the total costs per inhabitant, Stockholm (€859.88) and Paris (€844.12) have the highest costs, closely followed by Zurich (€596.47) and Helsinki (€553.11). Amsterdam (€399.81), Madrid (€360.90), Barcelona (€332.97), and Prague (€315.40) are ranked next, while Warsaw is again ranked at the end of the list with €242.80.

Amsterdam (€5,443,478.26) has the highest cost per line, followed by Stockholm (€3,938,342.97), Paris (€3,582,900.66), and Madrid (€3,455,176.82). Helsinki (€2,248,623.85), Barcelona (€2,160,000.00) and Zurich (€ 2,141,184.29) are ranked next, followed by Warsaw (€1,721,931.22) and Prague (€1,483,836.78).

Paris (€824,846.60) has the highest total costs per vehicle, followed by Stockholm (€657,446.12) and Amsterdam (€550,087.87). Barcelona (€417,884.78), Helsinki (€415,658.56), Zurich (€387,987.67), and Madrid (€354,690.72) form a cluster and are ranked next, followed by Warsaw (€242,869.40) and Prague (€220,963.08).

In terms of total costs per vkm follow a similar trend, with Paris leading the group with €20.60. Zurich (€10.28) is ranked next, followed by Amsterdam (€8.58) and Stockholm (€8.03). Helsinki (€6.23) is located between the higher and lower clusters, while Barcelona (€4.50), Madrid (€3.86), and Prague (€3.84) are ranked next. Warsaw is ranked last with a cost of €2.42 per vkm.

Finally, revenue per passenger Amsterdam ranks, as already mentioned, the highest (€1.25) followed by a cluster between Helsinki (0.97€), Stockholm (€0.96) and Paris (€0.83). Another cluster can be located between Zürich (€0.73), Barcelona (€0.66) and Madrid (€0.64). The lowest number have Prague (€0.27) and Warsaw (€0.17).

Financial efficiency (table 3): revenue passenger / total costs, operating subsidy / total costs, total revenue / total costs, other revenues / total costs

In terms of financial efficiency, the ratio of passenger revenues varies across the investigated metropolises, ranging from 65.65% in Amsterdam to 20.48% in Prague. This variation is reflected in the ratio of operating subsidies per total costs, with Prague having the highest rate of subsidies at 79.52% and Zurich having the lowest at 34.13%. Paris is the metropolis that covers more than its costs with combining all types of revenues, while Barcelona has the highest backlog in covering its costs with revenues. Stockholm has the highest ratio of other revenues, covering 18.44% of its total costs, while Amsterdam and Prague do not cover any of their costs with other revenue.

In terms of the ratio of operating subsidies, the extreme metropolises are Prague, Zurich, and Amsterdam, with very low ratios of operating subsidies. Stockholm, Barcelona, and Helsinki have similar ratios of subsidies, ranging from 43-47%. Madrid has a ratio of 57.9%, and

Warsaw has a ratio of 64.79%. The passenger revenue ratio is consistently an inversion of the operating subsidy ratio.

Resource efficiency in mobility (table 4): vkm / vehicles, total passenger / vehicles, total passenger / vkm

Warsaw has the highest vkm per vehicle ratio (100,182.86 km) and Zurich has the lowest (37,747.63 km). The highest number of passengers per vehicle is found in Warsaw (448,377.31) and the lowest in Prague (168,320.36). Paris has the highest number of passengers per vkm (9.31), while Madrid has the lowest (2.57).

Based on these figures, certain clusters can be observed. Warsaw (100,182.86) km has the highest vkm per vehicle ratio, followed by Madrid and Barcelona with almost identical values (91,932.15 and 92,798.80). The cities of Amsterdam, Stockholm, Prague, and Helsinki fall in between, with vkm per vehicle ratios ranging from 57,515.43 to 81,912.05. The cities with the lowest vkm / vehicle ratios are Zurich (37,747.67 km) and Paris (40,036.50 km).

The highest number of passengers per vehicle is in Warsaw (448,377.31), while the lowest is in Prague (168,320.36). Paris has a significantly higher number of passengers per vehicle than other metropolises such as Barcelona, Madrid, Amsterdam, Zurich, Stockholm, and Helsinki, ranging from 288,049.21 to 224,381.57 to people per vehicle.

The highest total passengers per vkm number can be found in Paris (9.31) and Zurich (7.56), followed by Amsterdam (4.49) and Warsaw (4.48). The other metropolises, including Stockholm, Helsinki, Barcelona, Prague, and Madrid, have ratios ranging from 3.40 to 2.57.

Therefore, there are various patterns and clusters identifiable within this set of indicators.

Importance and impact of subsidies: operating subsidy / passenger, operating subsidy / inhabitant, operating subsidy / vkm, operating subsidy / total revenue

Paris has the highest operating subsidy per passenger (€1.44), followed by Stockholm (€1.04) and Prague (€1.02). A cluster with operating subsidy per passenger ranging from €0.88 to €0.66 can be identified between Helsinki, Madrid, Barcelona, and Amsterdam. The lowest values can be found in Zurich (€0.46) and Warsaw (€0.35).

Paris also has the highest operating subsidy per inhabitant (€550.54), followed by Stockholm (€372.73). A cluster can be identified between Helsinki (€261.85), Prague (€250.82), Madrid (€208.96), and Zurich (€203.60). The smallest operating subsidy per inhabitant can be found in Warsaw (€157.31), Barcelona (€153.72), and Amsterdam (€137.31).

Paris ranks highest in the operating subsidy per vehicle kilometer category with €13.44, followed by Zurich (€3.51) and Stockholm (€3.48). Prague (€3.06), Helsinki (€2.95), and Amsterdam (€2.95) are located just below. The least operating subsidy per vehicle kilometer can be found in Madrid (€2.23), Barcelona (€2.08), and Warsaw (€1.57).

The ranking of operating subsidy per total revenue behaves similarly to that of operating subsidy per total costs.

Mobility (table 5): vehicles / lines, total passenger / inhabitants, modal split public transport, motorized vehicle / 1000 people, network extension (km) / territory area, total passengers / population density

When it comes to mobility metrics, there are notable differences in trends among the diverse sample group. Amsterdam has the highest number of vehicles per line, with 9.9, while Paris has only 4.43 per line. The city with the highest total passengers per inhabitant is Warsaw, with 448.25, and the least is Amsterdam, with 209.36. Paris has the longest network extension in km per territory area, with 4.42 km, and Prague has the shortest, with 0.6 km. Paris also has the highest total passengers per population density, with 4,583,339.86, while Amsterdam has the least, with 214,589.22.

In terms of vehicle per line, Paris (9.9) and Madrid (9.74) have the highest values, followed by the cluster consisting of Warsaw (7.08) and Prague (6.72). The other cities, Stockholm (5.99), Zurich (5.52), Helsinki (5.41), Barcelona (5.17), and Paris (4.34) can also be grouped together.

Warsaw (448.25) and Zurich (438.69) have the highest numbers in terms of total passengers per inhabitant, followed by Paris (381.62) and Stockholm (363.89). Helsinki (298.58) can be located between Paris, Stockholm, and the cluster with the lowest numbers: Madrid (240.22), Barcelona (217.98), and Amsterdam (209.36).

In terms of network extension per territory area, Paris has the highest value, with 4.32 km of network per km² of territory area, followed by Madrid (2.94 km) and Zurich (2.64 km). Barcelona (1.95 km) is followed by a cluster consisting of Stockholm (1.49 km), Helsinki (1.47 km), and Amsterdam (1.32 km). The smallest numbers are for Warsaw (0.85 km) and Prague (0.60 km).

Paris leads the ranking of total passengers per population density, with 4,583,339.86, followed by Stockholm (2,370,328.55). After Stockholm, a cluster consisting of Prague (1,998,740.83), Barcelona (1,976,571.27), and Madrid (1,928,509.65) can be identified. Warsaw (1,292,748.25) is located between these cities and the cities with the lowest numbers, consisting of Zurich (806,743.79), Helsinki (587,606.24), and Amsterdam (214,589.22)

7.2 Descriptive evaluation of the expert interviews

In this section the expert interviews were summarized, based on the statements they made during the interview.

Category: Characteristics of a well-functioning public transport system

According to Thomas Kellenberger from the public transport authority of Zurich (ZVV), an effective public transportation system should have a dense and well-coordinated supply covering different lines and cross connections in order to achieve an optimal capacity utilization. The various networks such as bus, tram, metro, regional train, and fast train should be well-integrated. The network should be provided regularly and be easy to remember. Fares need to be simple and straightforward, offering single, day, monthly, and annual passes. The quality of infrastructure is equally important. Passenger revenues should cover a significant part of the total costs of the system, but ticket fares should not be exaggerated, and customers are willing to pay higher prices for higher quality services. Separations between first and second class are highly appreciated by customers.

Lluís Alegre Valls from the Barcelona authority (ATM) suggests that a well-functioning public transportation system should have a dense network with high frequency, dependent on the location's needs. A high-quality service in terms of comfort and safety is also crucial. The system should be easy to understand and logically thought out. The integration of various lines and networks should be highly integrated and coordinated. In addition to public transportation, other mobility infrastructure such as roads, bike paths, and walking paths should be part of this integration. The most important factor in evaluating a public transport system is measuring customer satisfaction, followed by other indicators such as efficiency and economic indicators.

Alexandre Santacreu, president of the EMTA association emphasizes the importance of modal share and modifies this by questioning which is the percentage of customers actually choosing public transportation over other forms of transportation. More customer research is needed to understand customers' needs and mobility within a specific area to provide the best possible service to people. Public transportation should not be viewed separately but more as part of sustainable ridership, along with biking and walking. Important indicators to measure the efficiency of public transport systems could be cost efficiency, cost coverage, and cost per passenger km. The analysis of these simple indicators should always be viewed within their specific context.

Ingrid de Bruijn suggests that a well-functioning public transport system should have dense network coverage with an appropriate frequency of vehicles. The modal split is one key indicator of efficiency, and integration and coordination of various lines and networks are crucial.

In general, the experts agree that an effective public transport system should have a dense network with a high frequency of vehicles. Well-integrated and coordinated networks and lines play a key role in this. The system needs to be easy to understand, and infrastructure should meet high-quality standards. The service must meet customer needs and promote sustainable

ridership. Evaluation and analysis should be conducted using indicators such as modal share, cost coverage, and customer satisfaction.

Category: Organizational structure, entities, number of operators, tendering versus awarding

Thomas Kellenberger believes that transport authorities should have a wide range of responsibilities and powers to achieve their goals. While different entities, such as the operators can perform certain tasks, important decisions should be taken together. Within the ZVV, they believe in long-term relationships between authorities and operators, rather than in tendering. Well-formulated contracts should be made, and tendering should only be a last resort. If there are cost-efficiency problems, it should be improved, in collaboration with the operator. The right number of operators is important to avoid a monopolistic system and coordination problems.

Lluís Alegre Valls also believes that public transport should be managed and coordinated by one entity to avoid managerial problems and inefficient administration. The actual number of operators is not as important as ensuring that the separation of the territory for efficient tendering is well chosen. Tendering can lead to an efficient outcome, but contracts should focus on bonus and malus sections to incentivize operators to maintain a high level of quality. When tendering, the focus should be on quality rather than prices.

Alexandre Santacreu believes that strong governance and many powers for the public transport authority enable good management. Different responsible entities should be avoided and one strong authority can create stability. Also, a bigger budget can help authorities receive power within the political construct. In his opinion, a strong transport authority should handle tasks such as marketing, ticketing, planning, funding, and contracting. Tendering is one key instrument to increase cost efficiency, and contracting is the most important thing when doing it.

Ingrid de Bruijn and the Vervoerregio Amsterdam have a different approach on dealing with public transportation. They tender almost all the tasks of a public transport authority, such as planning, marketing, and funding, out to the operators, using a net contract that enables the operator to increase revenue by their own actions. The public authority ensures that all the important integration aspects are included in the contract and also deeply considers the areas they are tendering out to give operators many opportunities to increase passenger numbers. Contracts are the key part, including a framework for ticketing as well as quality standards, which serves as a ruleset for operators. They have a uniform payment and timetable system for customers to create an easy-to-understand system.

The experts' conclusion is that one transportation authority should be given a wide range of responsibilities and capabilities. There are various ways of organizing the public transport system, either by a strong authority or by strong contracts that delegate tasks directly to operators. The optimal number of operators depends on the area. When tendering, it should be considered which area or lines are being tendered. Collaboration between operators and the public authority can be through long-term relationships or tendering with high-complex contracts. Both ways can achieve a high-quality result. Certain tasks, such as ticketing, should be done by the

authority. Regardless of a tendering or direct-awarded process, the key is strong authorities and well-written contracts.

Category: Costs, Funding, subsidies, passenger revenues, ticket and fare policies.

According to Thomas Kellenberger on behalf of the ZVV, cost coverage is a crucial index when discussing funding. It stands at around 60% (approximately 60% of cost coverage through passenger revenues and 40% cost coverage coming in form of public subsidies) in the ZVV area. Passengers should contribute to public transport funding, but ticket prices must remain competitive to attract customers and compete with other modes of transportation. The tariff system is divided into zones, which works best for densely populated areas. In the ZVV area, they still offer classical tickets such as single rides, daily tickets, and monthly/annual passes. They also introduced special fares to break peak loads, but this has only a small impact on demand. To make the system even more user-friendly, they introduced a check-in-check-out-system that can be done with a bank card. This is not a special tariff but a new form of distribution worth mentioning. Generally, public transportation expenses will rise in the future, but the ratio between passenger revenues and subsidies should remain the same.

For Lluís Alegre Valls and ATM Barcelona, a 30% cost coverage ratio between passenger revenues and operating subsidies is considered legitimate. To reduce costs, certain infrastructures changes such as the number of stops or prioritized bus lines should be implied. Also, the electrification and autonomous driving vehicles can lead to cost reduction. Additionally, public transportation should be funded by extra taxes such as road pricing, taxes on congestion, or revenues from car parking. Low emission zones could be politically implemented, and social funding could be available for people who cannot afford public transportation. ATM intends to switch from regular tickets such as single trips, 10 trips, or monthly tickets to a kilometer-based system. Ticketing should become more individualistic, also the subsidy process for costumers. Peak load prices should be introduced, to flatten demand, also if it has only a small impact.

Alexandre Santacreu strongly believes that tendering is the best instrument to lower costs, but it needs to be done correctly by lowering entry barriers for potential tenders. It should be considered where it is implemented because certain fragile systems may be better to keep in-house and, therefore, awarded directly. Optimal pricing can be calculated, and customer passenger revenues should make up a good part of overall costs. According to Alexandre Santacreu, around 50% of cost coverage through passengers is acceptable. Annual tickets make customers loyal to public transport but pay-as-you-go (check-in-check-out-systems) with price capping works even better. The goal is to make ticketing very attractive to use. With the climate crisis at hand, public transport deserves extra funding, which could come through new innovative means such as road pricing.

Ingrid de Bruijn believes that costs can be lowered by shifting tasks to the operators and incentivizing them to be efficient through well-written contracts. The number of subsidies that authorities receive remains the same every year, so they need to find ways to get the most out of it. Ticketing is done directly with a check-in-check-out system consisting of a fixed amount when boarding a vehicle and a variable amount per kilometer. Everything can be done via a bank card or the specific Dutch card for public transportation (OV card)

In general, the approaches to funding differ among experts. The opinions regarding the ratio of passenger revenues and subsidies vary from authority to authority. All agree that ticketing must be easy for customers, but there are different forms of tickets to achieve this. Facing the climate crisis, they believe that more funding will be necessary for the public transport sector, and there could be new ways of gaining revenue through taxes on parking, roads, etc.

Category: Challenges, risks and opportunities

Thomas Kellenberger highlights the challenges that public transport will face, such as increasing demand due to population growth, rising costs, and limited space for new infrastructure projects. Finding space for such projects will be a crucial task and must be in accordance with the population's needs.

Lluís Alegre Valls considers politics to be the biggest challenge facing public transport. Proper coordination and cooperation among different entities is necessary, and implementing certain measures like area restrictions or car taxes depends on the policies. ATM's upcoming challenges include achieving territorial equitable coverage and implementing MaaS projects. Increasing prices and climate change are also seen as future challenges.

Alexandre Santacreu also sees politics as the biggest challenge, as public transport needs stable political guidance over a longer period, whereas politics tend to change every few years. Additionally, a lack of initiatives from the European Union is seen as a challenge and funding will become a concern as prices and demand rise.

Ingrid de Bruijn of the Vervoerregio Amsterdam sees rising expenses as a major concern for public transportation in the future.

In conclusion, the biggest challenges facing public transportation in the future are increasing costs, political instability, and political weakness.

8 DISCUSSION

The goal of the following chapter is to discuss the findings described in Chapter 7 and to respond to the research questions presented in the introduction section of this study question by question.

The research questions are restated here for clarity:

- What are the key characteristics of a well-functioning public transportation system?
- Which approaches in terms of organization do the investigated systems follow?
- How common are subsidies in the investigated public transportation systems?
- Are there major differences in the funding of the analyzed systems?
- Can system organizations and funding trends be identified within the comparison group?

By responding to the research questions, an additional conclusionary research question is:

- What are the difficulties and challenges involved in evaluating different public transportation systems?

What are the key characteristics of an effective public transportation system?

This question can be answered by referring to the findings of the expert interviews. Experts do agree that the essential key characteristics of an efficient public transportation system are the following ones:

A regular, well-integrated, and coordinated dense network that is easy to remember and has simple fares.

It is essential to highlight that different public transportation systems have distinct goals and strategies, therefore it is important to mention that the key characteristics of an effective public transportation system might differ from city to city. Each metropolis faces its own challenges and, as a result, adopts its own approaches to a well-integrated and coordinated dense network. This can be seen in the evaluation of the systems on behalf of the metrics:

Indicators such as network density and cost efficiency per passenger or per line can be used to describe the efficiency of a public transportation system. However, it is important to acknowledge the limitations of this study and its data evaluation. These limitations are detailed in chapter 9.

When looking at the numeric findings of the systems, Warsaw was found to have the lowest cost impact in most cases. The origin of this low number may be explained by the authority's way of counting the total passengers; which is more generous than in other systems. However, it is important to note that costs per line or per vehicle may vary depending on the type of vehicle used and its maintenance costs. As revealed in expert interviews, rail networks are

generally more expensive than bus networks, with higher maintenance costs. Different costs of living between cities, including high disparities in average wages, could be possible reasons for this observation.

Cities such as Paris and Stockholm have higher costs per line, per vehicle, and per passenger, this can be explained due to their extensive rail and ferry networks. These systems are well-coordinated and connected in their own ways, highlighting the importance of considering individual city characteristics and goals in evaluating transportation effectiveness.

In Chapter 5, table 2 presents resource efficiency in mobility indices, which vary depending on the quality strategies set by different transport companies. For example, the public transportation system in Warsaw archives a high amount of vehicle kilometers (vkm) per vehicle and has many passengers per vehicle, while Zurich has fewer vkm per vehicle and fewer passengers per vehicle. These differences reflect varying approaches to quality in service. Some systems prioritize comfort, which may require high-quality vehicles with lower vkm but require more maintenance and fewer passengers per vehicle. Other systems prioritize high asset utilization and lower costs, with less focus on comfort and more passengers per vehicle.

In conclusion, the key characteristics of an well-functioning public transportation system depend on specifically the location and the customer's preferences. The study's expert interviews highlighted the importance of understanding customers' needs to compose an interesting offer that best suits the legal, economic, and administrative barriers faced by each transport authority.

Which approach in terms of organization do the investigated systems follow?

This research question only be partially answered due to the inherent bias resulting from the sample group identification rules. Nonetheless, all investigated public transportation systems have a single responsible authority in charge of planning, managing, and coordinating transport services for a particular region. However, the extent of competencies and powers vested in the authorities varies considerably among the sampled systems. The study found that different entities can organize transport services in various ways, but generally, experts agree on the most successful approach.

It is essential to recognize that the organization of every service is dependent on different cultural, historical, geographical, and political backgrounds. The tasks of each authority vary significantly from metropolitan area to metropolitan area. Some authorities have significant managerial freedom and strong funding, while others are heavily reliant on local municipalities, governments, and political decisions.

The experts concur that authorities require power and responsibilities to efficiently carry out their tasks and create an attractive and well-functioning public transportation service. Independently of whether the service is tendered out or directly awarded to companies, private or in-house, contracting is the key element. Experts strongly agree that contracting is a challenging and complex task, but it can make a significant difference in quality and costs. Incentives, such as bonus and malus clauses, are essential for successful contracting. Unfortunately, establishing

a well-functioning authority is not always possible due to the complex administrative structures and the political importance of the topic.

Based on the research, transport authorities that are enjoying less dependence on municipalities and governments are the Île-de-France Mobilités in Paris, Züricher Verkehrsverbund in Zurich, Trafikförvaltningen in Stockholm, HSL in Helsinki, and the Vervoerregio Amsterdam. These authorities have more powers and tasks, are integrated within the administrative construct, and propose certain mobility plans and measurements. In contrast, other transport authorities such as the ATM in Barcelona, the CRTM Madrid, the DPP in Prague, and the ZTM Warsaw, work more collaboratively with municipalities and are seen more as planning and representative authorities.

It is important to note that all the investigated authorities have unique characteristics and powers, and the separation done here serves only to provide an idea of how things can be structured. Another important factor to consider is how the responsible authorities organize their services, which can either be through tendering or direct awarding to certain companies. The approach adopted by the authority is to set conditions for the operator, including the number of kilometers (vkm), conditions for the vehicles and lines, and the exact time schedule. The operator is compensated based on a certain indicator, such as vkm done, and is mostly contracted via a gross contract. However, some authorities, such as the one in Amsterdam, manage public transportation services by contracting out to operators through a net-contract, giving them more freedom to manage their service.

In Zurich, authorities place a strong emphasis on establishing long-term relationships with operators through direct awarding. The relationship between them is based on close collaboration, with certain tasks, such as planning the time schedule or the remuneration of costs, jointly undertaken.

The study found that various hierarchies and responsibilities could be observed across the investigated sample group, and while some authorities believe their approach to organizing services is the best for their corresponding case.

How common are subsidies in the investigated public transportation systems?

Subsidies are present in all the investigated public transportation systems, and experts unanimously agree that an attractive public transportation service would not be possible without subsidies. Funding public transportation via subsidies is also deemed legitimate.

For some authorities, such as Zurich's, it is essential to keep subsidies moderate. They strongly believe that passengers should contribute a significant share to public transportation. In the example of Zurich, subsidies make up 34.13% of the total costs. In contrast, Barcelona believes that a major part of funding should come from subsidies. This is heavily dependent on the country and politics, and in Prague, politicians made the decision to keep fares low and increase funding through subsidies. Another example is the case of Amsterdam, where the authority has a fixed budget on subsidies available over years for public transportation. It is up to them to increase funding through contracting, quality, and the well-functioning of the public

transportation service. It should be noted that other authorities do not receive endless funds for their service, but Amsterdam has a different organizational approach to it.

As previously mentioned, the design of a public transportation fare system depends on various factors, including politics, economic conditions, history, and the organizational structure of the transportation authority. Experts agree that passengers should contribute to the funding of the system, but subsidies will always be necessary. This is justified because public transportation has many positive effects on well-being compared to individual car traffic.

Are there major differences in the funding of the analyzed systems?

Public transportation is mostly funded by two sources: subsidies and passenger revenues, which include the revenues authorities generate through fares and ticketing. Other types of revenue depend on the form of contracting between authorities with their municipalities and operators. However, these two modes of funding are the major ones and balance themselves out, meaning low passenger revenues equate to high subsidies and vice versa.

When evaluating the degree of funding by subsidies, significant differences are noticeable. The share of funding, in the context of the total costs, ranges from 79.52% to 34.13%. The majority of the investigated systems are situated around 40-60%. The opinions on how big the share of subsidies should differ from expert to expert, and this can be seen in the chapter 5. It is important to highlight that this depends on many factors, most notably the purchasing power of citizens, politics, the power of authorities, and the needs of customers.

To promote commercialization and funding, it is essential to have a fare system that is easy to understand and user-friendly. Typically, territories are divided into different tariff zones, and a supplementary price is charged when commuting between zones. There are two dominant fare systems: classical tickets and pay-as-you-go tickets. Both have advantages and disadvantages for both customers and the company. However, a trend towards combining both systems with price caps has emerged. This system is already implemented in Zurich and inspired by the Transport of London's ticketing.

While there are various ticketing options available, the strategy behind each one is unique. Nonetheless, all transportation authorities agree that public transportation must be inclusive and offer special fare types for low-income and disadvantaged groups. Many authorities have also introduced special tickets and fares to reduce demand peaks and distribute the demand more evenly, although these measures have only a small effect.

Can system organizations and funding trends be identified within the comparison group?

Regarding the future evolution of subsidies, experts agree that subsidies will play a crucial role in the future to achieve environmental and mobility goals set by governments. Due to rising prices and the challenges brought by the COVID-19 pandemic, subsidies are likely to increase.

However, the degree of such an increase is dependent on politics, as subsidies and fare prices are often influenced by political decisions.

Speaking of an organizational trend, experts agree that the trend is moving towards stronger public transportation authorities with significant political, administrative, and economic power to organize public transportation services. This trend encompasses not only public transportation but also the overall mobility concepts for individual cars, pedestrians, bicycles, and public transportation.

It is important to note that all the public transportation systems within the comparison group are overseen by authorities responsible for organizing public transportation. However, the extent of the authority as well as the distribution of tasks between governments, authorities, and operators vary.

What are the difficulties and challenges involved in evaluating different public transportation systems

The main challenge in comparing public transportation systems is the lack of standardized databases, which can result in inaccurate comparisons. Public transportation systems are highly complex and unique in their own ways. Not only do historical and political factors come into play, but cultural and economic factors also need to be considered. When comparing different systems based on numerical data, it is crucial to ensure that the data is collected in a uniform and consistent manner. Unfortunately, within the sample group of this thesis, achieving uniform data collection is not possible due to variations in data collection methods and different national accounting practices. Further limitations are discussed in Chapter 9.

9 LIMITATIONS

This chapter discusses the limitations of the study. During the research and data collection process, discrepancies in data and limitations appeared that need to be considered when evaluating and comparing diverse public transportation systems. Various limitations had to be taken into consideration to conduct this research. Furthermore, it is noteworthy that despite contacting nine public transport authorities, only four experts were available for interviews. While the study's goal was to achieve the highest level of scientific rigor, it is possible that certain limitations influenced the study's results.

One of the biggest limitations occurred in chapter 4, where the data points were summarized to represent the service as a whole, without considering the differences in service produced. This was mainly due to a lack of data in some cases, where certain metropolises only had summarized data points available. The differences in labeling and categorizing of data is one of the major problems when comparing different public transport systems from different European metropolises plus Switzerland. Each country has a different approach to managing public transport and has different systems of data collection and accounting. Additionally, some investigated metropolises labeled and categorized their information differently than others from the sample group, resulting in discrepancies.

The number of total passengers is collected differently in every public transport system, depending on how the transport authorities measure it. The number of lines, network extensions, and total vehicles are summarized data points, irrespective of how extensive they are or the type of lines. The data points of total costs, other operating revenue, passenger revenue, and operating subsidies are dependent on the national way of accounting and cannot be considered entirely accurate. The funding of public transport also differs politically, and different ways of determining subsidies may not be included. Furthermore, the inhabitants of the area where the public transport system is operating may not reflect the number of people the system has to serve, as it does not consider tourism and other customer segments.

The measurement of modal split is based on surveys and interviews of people about their mobility behavior. The data may vary from sample to sample, depending on how and where it was collected. The data from 2019 was used for the entire research process, except for a few cases where data from previous years was used because it was valid for the year 2019.

Other limitations that occurred in chapter 4 include the selection process of the sample. Many European metropolises plus Switzerland could not be evaluated or included due to a lack of data. This lack of data may be existential and reach from missing data of one operator, responsible for a considerable service within the transport authority, to data that could not be located due to the lack of transparency. The inherent bias generated by imposing all the different rules in chapter 4 is also a limitation. It was necessary to make the study feasible, although these biases affect the general sample group and the overall study. Only transportation systems that are organized in a specific way, considering transparency and availability of data, are included in this study.

Several data points were unable to be collected due to technical limitations in the design of the various transportation systems. This is particularly evident in table 7. In appendix C, it's clear

that several metrics were unable to be applied due to the lack of data collected by the majority of transportation authorities, operators, and other institutions.

The interpretation of the applied metrics based on the found data points is done only by the author. Due to the complexity of each data point and the differences in how the various entities collected the data points, it is nearly impossible to evaluate these systems based on the applied metrics. There is insufficient knowledge to conduct a comprehensive evaluation. Therefore, when conducting a descriptive analysis in chapter 7 and discussing these findings in chapter 8, it is essential to highlight that these are based on the mentioned literature and the conducted expert interviews.

It is important to keep the above-mentioned limitations in mind when interpreting the findings presented in chapter 5.4. The analysis is based solely on the data collected in chapter 4, and therefore, the evaluation of the selected metrics may not be fully representative due to potential differences in data points. Furthermore, the rating of the calculated metrics represents only an approximate rating of the outcomes, and not a true rating of the metropolises based on the selected metrics. It is worth noting that public transportation systems are difficult to compare solely based on an evaluation with summarized data points.

Analyzing Chapter 5.2.4 data reveals significant variations in the cost structures of public transport systems (PTS) across metropolises, notably Warsaw, Amsterdam, and Zurich. These differences in the comparison may be explained by considering the macroeconomic landscape of each sample, which is not done in this study. Economic development and income levels are crucial determinants shaping PTS design and costs. Divergent economic policies, energy price variations, and fuel costs, influenced by taxes, contribute to observed differences. Exchange rates, particularly in import-reliant economies, further impact cost variations.

The labor market structure, urban layout, and historical development influence PTS network design and vehicle mix. Varied maintenance costs are evident, with ferries in Amsterdam's PTS and buses in Warsaw. PTS design, reflecting customer preferences, affects fleet size and resource usage, thereby influencing the cost structure.

Customer priorities, such as affordability versus efficiency and reliability, shape PTS strategies. Some cities may opt for cost-effective solutions, accepting older vehicles and occasional line cancellations, while others prioritize reliability, investing in newer vehicles to minimize service disruptions. These numerous aspects provide context on the observed differences in Chapter 5.2.4 data, emphasizing the complex interplay of historical, urban, macroeconomic, and consumer-driven factors influencing PTS cost structures among metropolises.

It is important to note that the findings presented in chapter 7 are based on the applied metrics from chapter 5.4 and are only descriptive interpretations. The groups created by the author in Section 7.1 are not based on any strict rules but are intended to help readers better understand the results. While these findings can provide valuable insights, they should not be interpreted as definitive or representative of the transportation systems in the metropolises examined.

Despite the interviews being conducted with the highest possible degree of objectivity and a diverse group of interviewees in the author's view, one-sided opinions and perspectives cannot be completely excluded.

In conclusion, evaluating and further comparing public transportation systems from different countries is difficult due to the differences in data collection, categorization, and accounting methods. The limitations of this study need to be taken into consideration when evaluating and comparing diverse public transportation systems.

10 CONCLUSION

The goal of this thesis is to gain insight into the organization of public transport systems in European metropolises plus Switzerland, given the increasing demand for sustainable mobility as urban populations grow. The thesis aims to understand how well-functioning public transport systems are established and what factors influence their success. To achieve this, nine different public transport systems in nine metropolises were descriptively analyzed to determine what factors enable well-functioning public transportation. A meta-analysis was used to evaluate these systems, using selected metrics and the results were further analyzed. Expert interviews and theoretical frameworks were also used to better understand the complexity of these systems.

Although it is difficult to determine which public transportation system is the best while analyzing them, an individual descriptive evaluation, provided a better understanding of how this service should be implemented given each metropolis's unique case. The expert interviews revealed common approaches to key characteristics of an efficient public transport system, including a regular, well-integrated, and coordinated dense network, which is easy to remember and has simple fares. Moreover, understanding customers' needs is crucial in developing an attractive offer that addresses legal, economic, and administrative barriers faced by each transport authority.

In addition, it is recommended to establish a dedicated entity for public transportation; ideally for the entire mobility of a given territory. This entity should have the power to work independently to enable effective public transport planning. The goal should be to establish a powerful entity responsible for public transportation that focuses on customer needs and improves mobility in a socially, environmentally, and economically sustainable way.

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APPENDIX A: SOURCES OF TABLE 1, INPUT DATA

The sources were used to create table 1:

- Barcelona
 - ATM (2019), Transport-public ATM Barcelona 2019
 - TMB (2020), Pressupost 2019
 - ATM (2021), Summary of activities
 - TMB (2019), Presentation of TMB 2019
 - FGC (2019), Memoria2019
 - ATM (2019), Liquidació exercici 2019
 - Generalitat de Catalunya (2019), Les xifres del transport públic a Catalunya Any 2019
 - Adria Palacin Font (2023), Direct communication with an employee from the ATM
 - AMB (2019), Dades mobilitat 2019
 - ATM (2019), TransMet Xifres 2019
 - EMTA (2023), Barometer 2013-20
 - ATM (2020), Sumary of Activity
- Madrid
 - CRTM (2019), annual report 2019
 - CRTM Prensa (2013), Direct communication with the press team from the CRTM
 - EMTA (2023), Barometer 2013-20
 - Instituto de Estadística (2013), Madrid en cifras
 - Comunidad de Madrid (2017), Municipios de la Comunidad de Madrid
 - OECD (2007), OECD Territorial Reviews: Madrid, Spain 2007
- Amsterdam
 - EMTA (2023), Barometer 2013-20
 - Theo van der Linden (2023), Direct communication with an employee from the Vervoerregio Amsterdam
 - Vervoerregio Amsterdam (2019), Jaarstukken 2019
- Zürich
 - ZVV (2019), Geschäftsbericht 2019
 - Stankovic Filip (2023), Direct communication with an employee from the ZVV
 - Kanton Zürich (2023), Gemeinden
 - Bundesamt für Statistik (2023), Bruttoinlandsprodukt (BIP) nach Grossregion und Kanton - 2008-2020
 - Eidgenössische Steuerverwaltung ESTV, Eidgenössisches Finanzdepartement EFD (2020), Jahresmittelkurse 2019
- Paris
 - Ile-de-France Mobilités (2023), ventes et recettes 2019
 - Ile-de-France Mobilités (2023), Trafic annuel 2019
 - Ile-de-France Mobilités (2023), investissement 2019
 - Ile-de-France Mobilités (2023), depense globale 2019
 - Ile-de-France Mobilités (2023), feuille de route

- Ile-de-France Mobilités, Omnil (2023), Chiffres clés
 - Ile-de-France Mobilités, Omnil (2019), La nouvelle enquête globale transport
 - EMTA (2023), Barometer 2013-20
- Stockholm
 - SL (2019), Fakta om SL och regionen 2019
 - EMTA (2023), Barometer 2013-20
 - Halberg Per (2023), Direct communication with an employee from the SL
- Prague
 - ROPID, PID (2019), Co je PID a co dělá ROPID?
 - EMTA (2023), Barometer 2013-20
 - Filip Drápal (2023), direct communication with an employee from PID
- Helsinki
 - EMTA (2023), Barometer 2013-20
- Warsaw
 - ZTM, L. Peczyński, (2019), Raport Roczny ZTM 2019
 - EMTA (2023), Barometer 2013-20

APPENDIX B: STUDIES FOR META-ANALYSIS

The studies which were used to conduct the meta-analysis:

- Cruz, Barata, Ferreira, (2012) Performance in urban public transport systems: a critical analysis of the Portuguese case, University of Coimbra, Emerald.
- Hirschhorn, Veenemann, van de Velde, (2018) Inventory and rating of performance indicators and organisational features in metropolitan public transport: A worldwide Delphi survey, University of Technology Delft, Elsevier.
- Khan et al, (2021) Increasing public transport patronage – An analysis of planning principles and public transport governance in Swedish regions with the highest growth in ridership, Lund University, Malmö University, Elsevier.
- Boitani et al, (2006), To bid or not to bid, This is the question: The Italian experience in competitive tendering for local bus service, European Transport No. 33, Catholic University Milan, University of Pavia, University of Brescia, Applied Economics.
- Fitzova et al, (2018) Determinants of urban public transport efficiency: case study of the Czech Republic, University of Brno, Springer.
- Karlaftis, McCarthy, (1998) Operating subsidies and performance in public transit: an empirical study, Hellenic Air Force, Purdue University, Elsevier.
- Fielding et al, (1978) Performance indicators for transit management, University of California, Elsevier.
- McKinsey & Company, (2021) Urban transportation systems of 25 global cities – elements of success.
- Zope et al, (2019) Benchmarking: A tool for evaluation and monitoring sustainability of urban transport system in metropolitan cities of India, Civil Engineering Department, Sardar Vallabhbhai National Institute of Technology, Surat, Gujarat, India, Elsevier.
- Hilmola, (2011) Benchmarking efficiency of public passenger transport in larger cities, University of Technology Kouvola Finland, Emerald,
- Litman, (2017) Developing indicators for comprehensive and sustainable transport planning, Transportation Research Record.
- Jain et al, (2008) The impact of governance development models on urban rail efficiency, City University of Hong Kong, Heriot-Watt University Edinburgh Scotland, Napier University Edinburgh Scotland, Elsevier

APPENDIX C: TABLE FOR META-ANALYSIS

	Cruz, Barata, Ferreira, (2012) Performance in urban public transport systems: a critical analysis of the Portuguese case, University of Coimbra, Emerald	Hirschhorn, Veemann, van de Velde, (2018) Inventory and rating of performance indicators and organizational features in metropolitan public transport: A worldwide Delphi survey, University of Technology Delft, Elsevier.	McKinsey & Company, (2021) Urban transportation systems of 25 global cities – Elements of Success.	Zope et al, (2019) Benchmarking: A tool for evaluation and monitoring sustainability of urban transport system in metropolitan cities of India, Civil Engineering Department, Sardar Vallabhbhai National Institute of Technology, Surat, Gujarat, India, Elsevier.	Karlaftis, McCarthy, (1998) Operating subsidies and performance in public transit: an empirical study, Hellenic Air Force, Purdue University, Elsevier.	Hilmola, (2011) Benchmarking efficiency of public passenger transport in larger cities, University of Technology Kouvola Finland, Emerald.	Fielding et al, (1978) Performance indicators for transit management, University of California, Elsevier.	Litman, Developing Indicators for Comprehensive and Sustainable Transport Planning, Transportation Research Record, 2017.	Fitzova et al, (2018) Determinants of urban public transport efficiency: case study of the Czech Republic, University of Brno, Springer.	Jain et al, (2008) The impact of governance development models on urban rail efficiency, City University of Hong Kong, Heriot-Watt University Edinburgh Scotland, Napier University Edinburgh Scotland, Elsevier.	Khan et al, (2021) Increasing public transport patronage – An analysis of planning principles and public transport governance in Swedish regions with the highest growth in ridership, Lund University, Malmö University, Elsevier.	Boitani et al, (2006) To Bid or Not to Bid, This is the Question: The Italian Experience in Competitive Tendering for Local Bus Service, European Transport No. 33, Catholic University Milan, University of Pavia, University of Brescia, Applied Economics.
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Metrics	% subsidy in revenue	user satisfaction (overall Index) %	% of inhabitants living within 20 min walking distance PT service	population density	operating expenses / revenue vehicle mile	bus km / urban hectar	revenue vehicle hours / employee	per capital mobility	vkm	network length	total trips	subsidy / vkm
	vkm / employee	cost-recovery ration	% of bicycle lanes in total road network	per capital GDP	revenue vehicle mile / employee	tramway km / urban hectar	revenue vehicle hours / vehicle	mode split	employees	employees	population density	operating revenue / vkm
	passenger / employee	modal-Split	pedestrian infrastructure cohesion index	motorized Vehicle / 1000 people	revenue vehicle mile / vehicle capture effectiveness	light rail km / urban hectar	operating expenses / revenue vehicle hour	average commute time	vehicles	vehicles	total trips / population density	operating costs / vkm
	vkm / vehicle	% of inhabitants living within walking distance to frequent PT Service	motorway infrastructure cohesion index	peak hour travel speed	passenger / capital	metro km / urban hectar	revenue passenger / service area population	per capital congestion costs	costs	passenger trips		number of employees
	passenger / vehicle	passenger / inhabitant	road network quality index	congestion index	passenger / vehicle	suburban railway km / urban hectar	passenger / population	total per capital expenditures	passengers	vkm		costs of employees
	toe / vkm	ratio between travel time in car vs pt	density of road network, km ² per numbers of cars	per capital trip rate	passenger / revenue vehicle mile	bus km / inhabitant	total passenger / vehicles	affordability	network length			cost of material
	toe / passenger	punctuality	number of bicycles used in public rental system / million people	average trip length (km)	operating expenses / operating revenue	tramway km / inhabitant	revenue passenger / revenue vehicle hour	number of PT services in walking distance				operating revenues
	operating expenses / vkm	total Revenue / total Costs	number of cars used in carsharing system / million people	noise level	operating expenses / passenger	light rail km / inhabitant	operating expenses / total passenger	average commute time				
	operating expenses / passenger	costs per Passenger	% monthly travel card to average monthly income	number traffic accidents		metro km / inhabitant	operating expenses / revenue passenger	relative quality				
	passenger / inhabitant	Comfort	number categories reduced fare tickets	% trips per walk / bike (modal-split)		suburban railway km / inhabitant						
	operating revenue / passenger	policy integration	% cost of 1km taxi to monthly income									
	operating revenue / vehicle	funding	average 2h car parking costs									
	social participation / total revenue €	Longterm strategic PT plan	fees for private cars entering zones (downtown)									
	passenger / km	integrated planning	motor vehicle restriction rate									
	vkm / route length	integrated fare and ticketing	average PT travel speed during rush hour									
	average network speed	clear legal and regulatory frameworks	average waiting time									

	daily frequency	Contracts: risk allocation and incentive structure	% PT lanes in total length road network									
	overall occupancy rate %	skilset and technical expertise and stuff	underground train waiting time									
	operating revenue less operating expenses / passenger	awarding mechanism for employees	average bus age, years									
	operating revenue less total expenses / passenger	competition among operating companies	average metro age, years									
	operating revenue / operating subsidy		% busses accessibility for persons with reduced mobility									
	deficit / passenger		% metro accessibility for persons with reduces mobility									
	deficit / inhabitant		number traffic accident / million people per year									
	passenger / subsidy		number PT traffic accidents / million people per year									
	demand increase to "replace" subsidy											
	user satisfaction											
	cost recovery											

Table 7: Metrics identified through meta-analysis

metrics identified during the meta analysis	metrices as in colum 1 after removing the difficult-to-collect metrices	author added metrices	final list
operating subsidy / total revenue	operating subsidy / total revenue	total costs / lines	operating subsidy / operating revenue
vkm / employees	total costs / total passengers	total costs / vehicles	total costs / total passengers
vkm / vehicles	total costs / inhabitant	operating subsidy / passenger	total costs / inhabitant
total passenger / vkm	passenger revenue / total costs	vehicles / lines	total costs / lines
total passenger / vehicles	total revenue / total costs	inhabitants / operating subsidy	total costs / vehicles
total Passenger / inhabitant	total costs / vkm	operating subsidy / total costs	passenger revenue / total costs
total costs / vkm	total revenue / vkm	other revenues / total costs	total revenue / total costs
total costs / total passengers	subsidy / vkm	total passengers / population density	operating subsidy / total costs
Passenger revenue / total costs	passenger / subsidy	passenger revenue / total passenger	other revenues / total costs
total revenue / total costs	vkm / vehicles		operating subsidy / passenger
average network speed	total passenger / vkm		inhabitants / operating subsidy
average network speed during rush hour	total passenger / vehicles		total costs / vkm
deficit or profit / passengers	total passenger / inhabitant		subsidy / vkm
deficit or profit / inhabitant	modal split public transport		vkm / vehicles
passenger / operating subsidy	motorized vehicle / 1000 people		vehicles / lines
user satisfaction	network extension (km) / territory area		total passenger / vkm
modal split (of PTS and/or inhabitants)			total passenger / vehicles
% of inhabitants living within walking distance to PT Services			total Passenger / Inhabitant
punctuality			modal split public transport
motorized vehicle / 1000 people			motorized vehicle / 1000 people
average commute time			network extension (km) / territory area
affordability (monthly ticket / average income)			other revenues / total costs
territory area / network extension (km)			total passengers / population density
subsidy / vkm			passenger revenue / total passenger
total revenue / vkm			

Table 8: Stages leading up to the performance metrics final selection

cost impact
total costs / total passengers
total costs / inhabitant
total costs / lines
total costs / vehicles
total costs / vkm
passenger revenue / total passenger
financial efficiency
Passenger revenue / total costs
operating subsidy / total costs
total revenue / total costs
other revenues / total costs
resource efficiency in mobility
vkm / vehicles
total passenger / vehicles
total passenger / vkm
importance and impact of subsidies
operating subsidy / passenger
operating subsidy / inhabitants
operating subsidy / vkm
operating subsidy / total revenue
mobility
vehicles / lines
total passenger / inhabitant
modal split public transport
motorized vehicle / 1000 people
network extension (km) / territory area
total passengers / population density

Table 9: Final list of metrics by category

APPENDIX D: QUESTIONNAIRE FOR EXPERT INTERVIEWS

Introduction questions:

1. Please briefly describe your professional position within your authority/company?
2. What would you say are in general main characteristics which define a well working and attractive public transport service?
3. What would be a public transport role model, within the EU plus Switzerland, for you personally, but also for your authority?
4. How do you measure the success and impact of your public transportation service and which metrics do you use?
5. How would you consider the performance of your public transportation system in comparison to other transportation systems in the EU plus Switzerland and how would you position it?

Organizational structure, funding and subsidies:

1. What are the biggest challenges you face in managing and coordinating/managing public transportation in your area?
2. Do you think the organizational structure for the PT service in your area could be improved? Yes, no, why? Would it influence quality and costs?
3. Do you think the number of operators has an impact on the service? Speaking of service quality, costs or another measure of welfare?
4. What is your approach to tendering the service(s) to operators? How would more/less tendering improve the quality and costs?
5. How could the cost efficiency be improved? Would there be possibilities to save costs or generate different and new revenue streams?
6. How do you ensure that your public transport system is attractive to users? How did you determine your pricing policy? Is there any special tariff system?
7. Should the funding share of subsidies or passenger revenue be changed?
8. What is your opinion on subsidies? How will they evolve in the future?
9. Do you see any drawbacks, or problems in the subsidizing process?
10. What are the current long-term goals for your authority/company? How do you see it evolving over the time?

APPENDIX E: TRANSCRIPTS OF EXPERT INTERVIEWS

The following appendix includes all transcripts in English from the expert interview conducted. Two translations (Thomas Kellenberger from the ZVV Zurich and Lluís Alegre Valls from ATM Barcelona) and two conducted in English (Alexandre Santacreu from the EMTA and Ingrid de Bruijn Vervoerregio Amsterdam). The original transcriptions from Thomas Kellenberger and Lluís Alegre Valls can be found in the Appendix F.

Interview information

Date and Time: 20.04.2023 – 2:00pm

Location: Online – Google meet

Interviewee: Thomas Kellenberger

Organization: ZVV – Züricher Verkehrsverbund

Position: Head of Corporate Communications and Deputy Director

Initials of names

HT: Hannes Terzer, the Author of this paper as well as conductor of this interview

K: Thomas Kellenberger

Interview transcript

H: That would work, perfect. Also, in advance, it's okay for you if I mention your name as well as the ZVV and make it public in the master's thesis, is that...

K: Yes, that's fine.

HT: Super, super, super, super, good. Uh, yeah. Let's start the interview right away. Yes, let's conduct the interview in German. Although I sent you the questions in English, but oh well.

K: It's easier. I also like to do it in English, but I prefer German. Please briefly describe your professional position within the ZVV.

K: I am Head of Corporate Communications and Deputy Director of the Zurich Transport Network (ZVV).

HT: Okay. Have you been with them for a long time?

K: For 14 years, in various positions.

HT: Yes, great. Okay, then yeah. You know a lot about it.

K: Yes, I should.

HT: Yes. In general, what would you say are the main characteristics that define a well-functioning and attractive public transportation service?

K: We always say it's supply, supply, supply. We believe that the success of public transportation here in Zurich is mainly driven by the good, dense supply that has been built up over the past 30 years. Regularity of schedules, easy memorability, and of course, simple fare as well. These are the more specific factors that contribute to it. Price is certainly also a factor, but not as relevant compared to the supply, as we can confidently say. The price is less relevant than the supply. Of course, good infrastructure is also necessary, investments in infrastructure, and forward planning. And then good coordination with each other, that the supply is coordinated with each other.

HT: Super! Yes, yes, the density of lines is actually quite high, even compared to others. Um. What would be for you personally, but also for your authority, that is for ZVV, a model for public transportation within the EU and also Switzerland?

K: That's a difficult question. I believe that there are individual factors in different cities, large cities, or even metropolises from which we can all learn. We have a very good system here in Zurich. But we can certainly look at specific things, such as efficiency or coordination, even beyond national borders, and say yes, let ourselves be inspired or even travel. Therefore, I don't think that there is a good example. It is probably a combination of different structures involving the population. All these things improve the integration of public transportation.

HT: So, I think I could imagine that many other metropolitan regions look to Zurich as a model, but ZVV does not have a specific super example like the ones in Madrid are great or something like that?

K: We have many levels where we look to Germany and Austria, where we naturally have similar structures, also politically given the circumstances. In Munich, Berlin, Hamburg, Vienna, we also have close exchange. That is certainly beneficial. But we have very specific conditions here in our system, which we may come back to later with federalism. This is not always applicable in the same way, but we try. We try to look. London, of course, is very impressive in terms of efficiency, capacity, and new infrastructure projects. Sometimes we look at it enviously at what can be done there. It's a bit more difficult for us. But yeah, I don't think there is a single one that we could say is the ultimate one.

HT: Yeah, makes sense, makes sense. Okay, great. So, how do you measure the success and impact of the public transportation service? And what key performance indicators do you use?

K: Yes, as a consortium, we actually measure few key figures. These are provided by our transport companies. We monitor and evaluate the total number of passengers, boardings per year, and their development. We also look at the cost coverage ratio, which is an important

factor because we are partly publicly funded. We have to keep an eye on that. And we also look at the modal split, how public transport has developed compared to other modes of transport.

HT: So, actually, most of the figures are also in the annual reports.

K: Exactly, exactly.

HT: How would you rate the performance of your public transport system compared to other transport systems in the EU and Switzerland? And how and where would you position it?

K: I believe that in terms of cost coverage ratio, we are relatively high. As far as I know...

HT: So, by cost coverage, do you mean the proportion of tariff revenues?

K: Exactly, compared to total costs. And the proportion that has to be covered by public funds is relatively high, over 60%, for us. There are other consortia in Germany or Austria that have lower ratios. We probably have a higher ratio, but it is also important in our system, especially for political acceptance. We live in a direct democracy, we have many more votes on public transport projects. You have to have a feel for what people can still accept. You can't cost too much, because otherwise, the mood in the population will change. So, we have this economy, which is certainly highly valued in our system. In terms of modal split, I believe we are also relatively high. As a canton, as a whole rural canton, with the city of Zurich as the center. In the city of Zurich, we have very high modal split values of over 60%. In commuter traffic, of course, but also in the entire area, 32% of journeys are made by public transport. That's relatively high. I think we rate ourselves relatively high in that regard.

HT: Okay, then let's move on to the next questions: What are the biggest challenges that you face in managing and coordinating public transport in your area?

K: Goals... On the one hand, certainly finances. We are also a purchaser. We finance the entire transport offer and the infrastructure together. Everything is getting more expensive. Planning for new infrastructure is becoming more demanding. With spatial planning, environmental protection, with... Public transport is increasingly coming under pressure because space is limited in cities. There are other modes of transport that also want space. You have to find the right balance. This is currently a process for us, which is ongoing and also very demanding, to make the right decisions, also in terms of planning, climate policy, and transport policy, to rely on public transport. Capacity is certainly also a big problem, to provide it in this form, to plan it in time. Our population is growing and our demand is growing. Our system, and especially the S-Bahn, cannot grow so quickly. We need expansions. It takes 10 to 15 years to build them. We are always reaching our limits. These are difficulties that we try to address proactively, so that they do not explode.

HT: Well, great... Uh... Do you think the organizational structure for public transport management in your area could be improved? Yes. No. Why? How would this affect quality and costs?

K: As a consortium, we are a part of the canton. We are a company of the canton and the administration. What is very good is the embedding in this cantonal administration with politics, the proximity to politics. That helps us tremendously. Processes at the national level can

certainly be improved. There is still a national perspective in Switzerland. Public transport doesn't stop at the borders of the Canton of Zurich, so there are efforts to promote and improve national networking. This will take a while, and we can certainly improve a bit more and we need to work together on governance, financing questions, revenue sharing, distribution keys, etc. There may be opportunities to improve tariff systems, national tariff systems.

HT: But, in principle, with the ZVV as a transport network, that...

K: We believe that if you look at the history, the success proves that the organization is right. We also have probably been fortunate with the market we have, with Zurich as the geographical center, well located, and we were able to benefit from that. But I think that because we can finance the infrastructure ourselves, we have the fund, we can expand the transport infrastructure and plan the operation. Is public transport plannable as a whole? Yes, and that can be shaped. And I believe that this is a very efficient way to push public transport. We have had great political support since always. These are certainly very good factors that have favored us in the last 30 years.

HT: Great, yes...

K: I wouldn't change much about that, if it's not necessary.

HT: Yes, yes, yes, I think anyway, so if there is then a local transport authority, that is the optimum, as you have already said, also connected with politics and then it gives the maximum coordination, coordination and management.

K: Exactly.

HT: Do you think that the number of operators has an impact on the service? In terms of service quality, costs, and other welfare measures, and with operators, the transport companies that work for you...

K: I don't think the number has an impact, these are grown systems, the transport companies that existed before the consortium. That has naturally grown, there may be some optimization, but basically it works relatively well with the existing companies we had there. Collaboration with the S-Bahn, the backbone, and in the cities, the municipal transport companies are very sensible, divided. We have also defined market areas where the individual transport companies are responsible. We think a certain diversity is necessary, that also gives a certain competition, an idea competition, gives motivation. You can be a little more agile. Too much will be more difficult to manage. Probably. So you probably have to find the middle ground between too little, where you then fall into the monopoly patch, and too much, which then becomes arbitrary and difficult to manage.

HT: With you, it is divided into eight or nine...

K: Market responsible transport companies, exactly.

HT: Okay.

K: They have a regional responsibility. They also operate the timetable design in their area. They have contact with the municipalities, they perform, they are concession holders in this area. And we have contact with them in these matters when it comes to financing, timetable, tariffs, and they have further transport agents among themselves. If they do not want to provide the service themselves, they can also tender services or whatever. There are a total of 37 transport companies.

HT: Ah, so then it becomes practical. The ZVV then hands over certain tasks, because... ah, okay.

K: Actually, it's the other way around, because we came later. They had their tasks from the concession before. They have certain tasks delegated to us by law. We take over tariff planning and they take over another part. And the service can be further delegated to other transport agents.

HT: So you actually have no influence on the actual allocation of transport services, on the tendering or direct award, depending on the case.

K: But we have to agree to it. However, tendering is not the norm for us. Okay, we work with a different system, which I don't know if you have also read our strategy report. It's in there under market regulation. No, we prefer to rely on continuous cooperation with our transport companies and conclude target agreements, etc., for cost efficiency. And tenders are only the ultima ratio, the last resort, even if financial and quality goals cannot be achieved.

HT: So everything has really grown historically like that.

K: Yes, exactly.

HT: Do you actually believe now or do you remain convinced that costs could perhaps be saved if it were tendered out even more extremely now?

K: We don't think so. We think maybe costs, like quality, one always has to look at the cost-quality trade-off... We think that in a long-term cooperation, the cooperation is also easier, one can have a better influence on quality than with changing providers, who then are also different from us... We think we can better achieve our financial and quality goals this way. And politically, this is always approved by us, actually the procedure is confirmed like this every two years, also by our cantonal parliament, that we do not want to enter into full competition there, because we do not think that there is so much to gain.

HT: Very interesting point. So, then the next question: What would be your approach in tendering out services to the operator? We just talked about that.

K: Exactly, we covered that... So there have already been tenders for individual transport agents for individual services, but very rarely. That is then done by the transport companies. They then tender individual lines. But in Switzerland, we also have no obligation to tender. In rail transport anyway, and in the rest of public transport, it can be done, but doesn't have to be.

HT: How could cost efficiency be improved? Are there ways to save costs or generate new sources of income?

K: Yes, that's finances, as I said. As a cantonal authority, we are very interested in keeping the deficit for cantons and municipalities relatively low or running reasonably. We put financial pressure on the transport companies. That's our task. We have to ensure that efficiency improvements are achieved. We think that... we measure quality and if they are outside a defined framework, then costs have to be reduced. We achieve this with target agreements or binding agreements on how much costs must be reduced in the next six years at the company. And we have had good experiences with this, because we don't... and only then comes the threat of tendering, so the threat of tendering. It also motivates transport companies to achieve more goals, which are also ambitious, but at least achievable. Yes, I believe that this is a better collaboration in the interest of the matter.

HT: Has it ever happened in the past that an operator of yours has pushed it to the limit and you were very close to the threat of tendering or replacement?

K: No, that did and did not happen and that was, well... at the moment we think that the costs are... you can also see this chart that we have. Most of them are within this framework, the ones that are outside, we look at how we can reduce costs. This is constantly being adjusted, of course, a little bit stricter in terms of quality. You should also improve yourself. So, we believe that we are going in the right direction together. So far, we haven't had to put it in writing.

HT: How do you ensure that your public transportation service is attractive to users? How did you determine the pricing policy? And are there special fare systems?

K: Maybe starting from the end, we have a well-known network tariff that is divided into zones. As is logical, this has been introduced 33 years ago. From our perspective, this is a great advantage, especially in agglomerations, because individual routes are priced very differently. This can also have traffic-leading effects that are undesirable. We have so many cross-connections and parallel connections. So we think that the zone tariff is unbeatable in densely populated areas. We don't have a specific system. Otherwise, we are relatively conservative in this area. We know the normal day and single tickets and subscriptions. We still have national subscriptions, the General Subscription, the Half-day... that overlap. You can travel throughout Switzerland with the G, which is also recognized by us. There is a discount on all prices with the half-day, also in Switzerland, also with us. So, there are different levels of tariff stages. We believe that this makes the price level very attractive for the service offered. It may be a bit higher compared to other countries. We also have higher living costs, higher wages. All of this adds up. But it is also a principle that is written in our constitution that the railway user, the public transport user, should contribute appropriately to the costs of public transport. This means, and we have an economic mandate in our law. Therefore, you have to find a balance there, what makes sense, how much can you skim off, so to speak, and how much do you need, but also to achieve the traffic and climate policy goals that you have set and you want to achieve a higher modal split. Therefore, we try to find a balance so that the public sector is not too burdened and at the same time the customers can get around easily and quickly. That is why distribution forms are also easier, distribution partners can join in the PT.

HT: I just tried to buy a ticket before... so, as you said, very classic tickets, so hourly tickets, 24-hour tickets, and then monthly and yearly subscriptions. You have now said that the price is higher. That was 3.10 Swiss francs for a single ride in the same tariff zone.

K: Three francs ten? Yes, exactly. That's correct. Let me quickly check the costs. I didn't have it on me...

HT: No, sorry, that was improvised...

K: That's for the city zone one... Yes, exactly. So no, that's a double zone, right? That costs a bit more. Just a moment... tickets... for one to two zones, for a single ticket it's 4.40 Swiss francs. If you don't have a half-day pass and if you have a half-day pass, which is common in Switzerland. And there were 3 million of these subscriptions sold. Half of the population has such a half-day pass, which costs three francs ten, that's correct. But the normal price is 4.40 Swiss francs.

HT: Okay, okay. Yeah, quite interesting. Is the ticket you have for 9:00 am? Yes, specifically to then distribute the demand a bit and reduce the peaks.

K: Exactly, we introduced that 20 years ago to break the peaks. That's one of the biggest challenges. Of course, the morning and evening peaks have changed a bit with home office, smoothed out slightly. But we actually noticed that people are only partially guided by price... The ticket was more than 50% cheaper. But there was only a very small shift to this 9:00 pass because people, if they have to work before 9:00, need a different ticket. So, for students, this ticket doesn't work, etc. So, you can't bring about such a big change in behavior with a very large discount that we granted. That was a bit of the learning from this tariff. It is still being used for weekends for leisure traffic and is a very attractive ticket, but the desired shift for the peaks or the smoothing of the peaks did not happen.

HT: What I also noticed was the transferable ticket...

K: That was a strong customer request. It was introduced relatively early, at the request of customers, and it is still in demand by some who simply want to transfer it.

HT: And, just a question, I have always seen that there are first-class and second-class options for the various tickets, is that only for certain regional areas or...?

K: That applies throughout the area, where there is first class available. Buses, of course, do not have first class, but with our combined tickets, you can also board long-distance trains...

HT: I see...

K: Yes, so the tickets are valid on all modes of transport, including ships. You can also travel first class on the ship with this ticket. Yes, we still adhere to that, it is a market. Especially in Switzerland, where public transport always has a very good reputation. People appreciate it and also want a certain offer for first class for commuters so they can work well. Yes, there is strong demand for that.

HT: Wow, okay, okay.

K: What I forgot, I don't know if you've seen it, is the check-in ticket. It's not a ticket, but a distribution solution to make it easier... Since you said you tried to buy a ticket, it exists... I don't know if you're familiar with it... It's nationwide, you can board, check-in and get off with

the app. It will be charged correctly. In the evening, it applies nationwide. Then the correct combined or national route ticket will be charged automatically. So, this reduces the barrier for using public transport. You don't need to buy a ticket in advance, you just get on, provide a payment method, you can even do it on invoice, and then slide the bolt and get off again, check-out, and receive an invoice for the best price.

HT: I have seen that too... I was recently in Amsterdam, and I saw it there for the first time... It was also great. Really very...

K: With us, it's a bit further developed because we have the whole country with all 250 transport companies connected. All tariffs are included, you can ride on mountain XY, all cable cars, everything is included. Everything is charged afterwards, including caps, a day pass, or whatever. Then you get the best price available.

HT: Great, sounds good, yes.

K: We're getting off track, sorry...

HT: I find this super interesting. It's useful. You don't see this often. Normally, I could imagine paying with a card and then getting some extra fee because you paid with a card. That might be common in other countries... A quick word about pricing. How do you determine that, how does it work? The process of how ZVV sets the prices.

K: We have to do financial planning. Of course, because we have to refinance the deficit from the canton. That means, we have to roughly estimate how much revenue we plan to generate for the next few years, how much expenses we have, and the delta. And we have to figure out how to cover that. And you have to look at when it becomes too high. Then you may have to consider a tariff measure. That's what happened now. This year, for the first time in seven years, we are adjusting the tariffs again. It has been the same for the past seven years and has not changed. Now, with inflation, we have higher costs. We have to absorb them a bit. We can't determine it ourselves because the cantons and municipalities finance it. So there is a consultation with all the municipalities first. They can comment on it and whether they like it or not. Our transportation department decides, and the government has to approve the tariff as well.

HT: Okay, so it goes through many levels practically.

K: Exactly, even the price watchdog can comment on it. And in the end, it's a politically legitimized tariff because it's approved by the government. It will be published that way.

HT: Okay, I see.

K: Very Swiss, direct democracy.

HT: If all these levels didn't exist, do you think, you've probably done a study, could the price be raised even higher with the same demand, or...

K: No, there is elasticity, logically. You reach a limit where you won't generate any more revenue with an increase. And we have to prevent that. It happened once in the 90s, I think, where we increased the tariffs by 6% or 7%, and then we had less in the cash register in the next year

than the previous year. And that was a warning for us. We can't overdo it; we really have to look at what's available in the market. It's not about squeezing out as much as possible, it's just about maintaining balance. What can be justified in politics? What deficits can we have before politics says, "Now you have to save," and then we have to cut back on the services we offer... We want to try to expand the services we offer as much as possible, steadily expand them, keep the prices stable, and if we have to raise them, do so moderately.

HT: Yes, okay. The main goal is to expand the services.

K: Exactly. Yes, and sometimes we have to reduce the services. That may come someday. If the deficit becomes too high, then the government or parliament will say, "We don't have the budget for this; something has to be cut." We have to avoid that, of course.

HT: Wonderful. Exactly. We've already touched on this: should the financing share of subsidies or fare revenues be changed?

K: We think we've found a good balance where our cost coverage is around 60% to 65%, which went down to around 70% shortly after Covid. But I believe it's politically appropriate and justifiable.

HT: Okay: What's your opinion on subsidies? How will they develop in the future?

K: Yes. If we look at our financial planning, it's a growing market. We will have more revenue, but we will also have more costs because we will have more people in our catchment area. That means our deficit will grow. Yes, we can only mitigate it a little with tariff revenue. We will certainly have more revenue, but it cannot be completely prevented that expenses will increase, and we will need more public support. Cost coverage will remain roughly the same. But because the whole business naturally takes an absolute number which will eventually increase with inflation, etc., we try to bring stability into it. We see this as a task to increase the acceptance of public transport in the entire population because not everyone uses public transport, but everyone pays for it through taxes. So, you need a bit of sensitivity. Yes, you have to make an effort. So, profitability is an important aspect for us as well.

HT: Otherwise, do you see any disadvantages or problems in the subsidy process?

K: I don't think so. In Switzerland... We get a rate loan for two years. You have to go back to parliament through the government every two years. So, it's not like you just get a blank check and then you have to present a small, clear bill, and then politically, everyone from left to right is represented in parliament and in the commissions and they look at it, does it fit reasonably, or are the costs getting out of control, or do we need to tighten the screws there? We have constant political control that actually doesn't allow anything to get out of control. Did that answer the question?

HT: Yes, the question was difficult to understand here... I think that's wonderful. Yes.

K: Okay, briefly...

HT: Last question already: What are the current long-term goals of the ZVV and how do you see the development?

K: That brings us back to the beginning. Of course, we want to continue expanding our transportation services. We have a major expansion planned for the middle of the next decade, where 6 billion Swiss francs will be invested in new railway infrastructure in our canton. This will enable us to expand our services by x percent and increase our capacity, which is absolutely necessary. We also have plans for urban railways, which are major projects worth hundreds of millions of francs, and we need to keep pushing them forward. This is a big task that requires keeping an eye on financing so that costs don't spiral out of control due to inflation, fuel prices, and energy prices. A major issue is decarbonization and electrification, which costs a lot of money but is necessary. However, we will become dependent on energy with power plants that we don't have. There are many depots and facilities that need to be built, and the planning consequences of expansion are very complex. For example, a new facility for the S-Bahn expansion requires ten kilometers of sidings, which is hard to find in densely populated areas. Nobody wants that right outside their door, and we need to consider many different interests. These are exciting questions that need to be solved because our goal is to increase the modal split to 40 percent or more. We need to expand or somehow shift transportation, and for that, we need the right infrastructure and offerings.

HT: Yes, of course. By electrification, you also mean all the buses, right?

K: Well, yes. Of course, but we still need to figure out where to put all the buses, the facilities for buses, and the power supply for them. Can we use them for something else during the day when they are parked and not in use? Otherwise, we are investing a lot of money that could be better used elsewhere. We need to look for the best projects and ideas because these are public funds. We still have many tasks and challenges to tackle, but we are working on them. And that's how we do it.

HT: Wonderful. Thank you. My question list is now complete, and you have given me some really interesting input.

Interview information

Date and Time: 24.04.2023 – 11:00 am

Location: Online – Google meet

Interviewee: Lluís Alegre Valls

Organization: ATM – Autoritat del Transport Metropolità

Position: Director of the mobility department

Initials of names

HT: Hannes Terzer, the Author of this paper as well as conductor of this interview

LAV: Lluís Alegre Valls, the interviewed

Interview transcript

HT: Okay, no problem. No problem. I think we will be finished in 30, 40 minutes. I'm happy to do this interview with you, with someone from the ATM, and that you have already received the questions, so you have an idea. Before we start, I want to ask you a few things about the privacy agreement. Are you okay with recording the interview?

LAV: Yes, I agree.

HT: Perfect, and also with mentioning your name in my master's thesis?

LAV: Yes, yes.

HT: Perfect. Perfect. I just have to write down your name because until now I didn't know who I was going to interview. I'm ready. Do you have a question for me before we start or not?

LAV: Well, I just wanted to ask you about the university. Which one was it?

HT: The University of Vienna.

LAV: Vienna? Okay.

HT: And I'm doing my master's thesis, basically researching various public transportation systems in metropolitan cities. That's it. This is the second interview I'm conducting. The first one was with someone from the Zurich Authority in Switzerland.

LAV: I see. And what's your background?

HT: Business administration

LAV: Ah, okay. Well, let's get to the point, because I have another meeting at noon.

HT: Okay, okay. Could you briefly write down your professional position within the ATM?

LAV: Yes, I can. I am the director of the mobility department. I am a civil engineer. That's how you call it, no? And I also have a degree in ADE in Finance and related topics.

HT: You have been working for ATM for a long time now, haven't you?

LAV: Yes, since 2006.

HT: What would you say are the main characteristics that define a well-functioning and attractive public transport service in general?

LAV: The main characteristics of a public transport service that manages well and is attractive... Well, a public transport service should take people close to where they live, work or where they want to go. Secondly, it should have a frequency that meets the needs of the demand at that point. It should be a logically accessible transport. Comfortable. Right? Let's say, it can, that caters to all the functional and safety needs that. That people...and yes, well, obviously it should work well. Yes. So, therefore, it should not have too many incidents...

HT: What would be, for you personally and also for ATM, a model to follow in public transport within the European Union and Switzerland?

LAV: A model to follow?

HT: Yes, exactly. ATM has, for example, I don't know, the model like the one in Madrid, a model where you want to arrive.

LAV: No, we don't have that. Look, this question catches me a bit off guard. We work with the idea of what we call a network model. All networks, no matter their level, should be interconnected and work together. That means from high-speed rail to bike paths, they should all be designed and planned together. Even though the high-speed rail network may connect Madrid, Zaragoza, and Barcelona or Barcelona with Perpignan, the intermediate stops also have an impact on the public transportation system in the city. For example, there's a city called Girona, which is about 80-90 kilometers from Barcelona, and it has both high-speed and regional trains that complement each other, but nobody thought of it before. They're super complementary, and there's also a bus system. So in terms of knowing what other authorities are doing regarding transportation, I don't have a lot of awareness right now. This is our model. Now, you might ask me if I like the Swiss railway. Well, I do like it, but I'm not sure if it's well-built for urban connections. I don't have enough information to say. I like the Dutch network. Yes, I like their network system, or also the German one, but I couldn't guarantee that they're built the way we're thinking about it now.

HT: Okay... How do you measure the success and impact of your public transportation service, and what metrics do you use?

LAV: Well, for success, we use two things. First and foremost, we prioritize people's opinions. Every year, we conduct a survey on the entire system to try to understand if we're doing well or not. So, what people think is very important. It's great if you say a system is good, but if people don't think so, then it's not. The second way is through efficiency and effectiveness indicators. In other words, to some extent, we look at whether the resources we use are leading people to where they need to go. If I put a train where I could take people with a bus, that's very inefficient and ineffective, so I need to consider that. I look at this from an economic and service perspective, and I have indicators for that too. Finally, I have economic indicators where I try to see if the cost of what I'm doing and the investment I'm using is proportional to the results I'm getting.

HT: And do you measure this with passenger revenue or with passenger numbers?

LAV: With demand, with the number of passengers, because revenue is subsidized in our system. So, revenue can be misleading. We don't focus on that. But we do look at it to see our coverage and other things. However, passenger revenue may only cover 35% of the expenses, and the other 65% comes from contributions from various institutions.

HT: Yeah, we'll talk about that later. So, how do you consider the performance of your public transportation system compared to other transportation systems in the European Union?

LAV: Well, we conduct a public transportation barometer at the European level, which I don't know if you're familiar with...

HT: Yes, the EMTA.

LAV: Yes, that's the system we use. So, every year, we present it to our board and see how it's going. It's not excessively good as a system because we have slightly different ways of measuring, but it's the best we've achieved.

HT: Right. Yes, yes, ultimately, comparison is always very difficult because, as you said before, it's heavily influenced by history and culture, right? Okay, okay, let's move on to the other questions. What are the biggest challenges faced by the minister who coordinates and manages public transportation in your area?

LAV: The biggest challenges? Well, first of all, public transportation is managed by various entities. It's the State, the regional government, the metropolitan governments, and the local governments, and each one of them has a different logic. Coordinating them is extremely difficult... difficult... I'm not saying it's impossible, but very, very difficult. This is also true for large infrastructures. It's a key issue. For example, in Barcelona, they are building a new tunnel. Actually, they are building two new tunnels. One will be built by the State and the other by the Catalonia government. But they don't communicate with each other. So, this is a big problem.

Another problem that public transportation faces right now is responding to the changes that are happening in the world. That is, responding to the need to increase the offer with a very limited budget. We need to grow public transportation a lot to decrease the use of private vehicles and to give more space to pedestrians, bicycles, and people. This requires investments that, right now, we haven't seen for quite a few years due to the crisis.

HT: Yes, yes... Then, I just want to add one thing. A big challenge is the policy and coordination among the various entities.

LAV: Yes, that's correct.

HT: The ATM doesn't have total authority. In some cases, for example...

LAV: We plan, we have the authority in planning. But planning never gets into the details of the project or the service. And in that step to the details, many things get lost.

HT: The organizational structure of the public transportation service in your area could be improved... We have already talked about that.

LAV: Yes, in my opinion, there are many streets. Today, we are going to talk about public transportation on the surface and public transportation by rail. Surface public transportation should be much more coordinated. Right now, it works at three levels: local, metropolitan, and inter-urban, each with its own logic. It's difficult. Excuse me for a moment...

HT: Yes...

LAV: We would say, the exchange points. They become very critical elements. And again, we have a great difficulty in making those exchange points and the issue of connections a safe responsibility of the transport authority. Because now they are generally the responsibility of the bigger one. That is, if there is a metro stop and a bus stop at that exchange point, the metro takes precedence. But they have to be equal, even if one is bigger than the other, for them to work well.

HT: So, I'm not sure if I understand it correctly. If there's a stop and two vehicles, the metro goes first. And if there's a bus, the metro takes priority?

LAV: The decision at the exchange always comes from the bigger one. But it forgets to think about the rest. So, I think that's a fundamental issue. That is, the exchange nodes are almost a national issue, if not an issue for each network. And the networks have to respect those exchange nodes at every level. The exchange nodes have different levels. No, no, they are not always national. It can be metropolitan, urban or even a level, let's say, when you have a tram. We have a tram. The tram is metropolitan, but it connects with all the urban networks. The exchange points for the tram are fundamental for the tram to work well, but also because the urban network is much more powerful. This also costs. This is a topic that should be much more integrated organizationally in our planning area, because we decide where it goes, but what happens inside it, we don't decide, and we should decide what happens inside it.

HT: So, do you think the number of everything has an impact on the service?

LAV: Yes, it is important, but it is important, above all, for the titular administrations, both are important. That is, the buses of each municipality belong to each municipality. But in this case, the problem is more organizational, not so much political, it is more about the networks. And at the moment when we think about the networks and...

HT: So the problem is that the public transport authority (ATM) is not strong enough or doesn't have enough competencies...

LAV: Yes, exactly.

HT: In general, there are many companies that offer or work in public transport under the ATM, if you pay for the service, do you think that having fewer operators would affect the quality, costs or other measures of well-being?

LAV: Well, I don't think it's a problem of the number of operators, because what determines the quality of a system is the set of requirements established by the public administration. If you make a good set of requirements and enforce them, that's it. It's obvious that a minimum size of operator is convenient for the purpose of being able to pay for the facilities. This is always the case, unless the facilities are public. But if the facilities are not public, there has to be a minimum number of services for them to be profitable. However, I also have to say that excessively large companies can have an influence on the service so that it adapts more to their needs than to those of the service. So my opinion is that there can be different sizes of companies. I believe, and my opinion is that large groups should stay in large projects, always just one, and in medium and small projects, smaller and more local or medium-sized companies should be able to participate, and I think they can do so perfectly well. Therefore, it's not a matter of the number of operators, but above all, it's about the set of requirements established by the public administration and their enforcement.

HT: A question about something we've talked about before, the problem of interchange points in Barcelona. There's basically TMB, which is responsible for the entire metro and the buses. Do they also face these problems with...

LAV: TMB is a large operator that is the operator for Barcelona. Its size is closely linked to the size of the city. Yes, I know, I understand. For example, Tarrasa, which is a city of 200,000 inhabitants, has a different operator and only has one clear operator. So, I understand that the urban service of a city should not be won by a single operator, or should it? The city is huge, huge, huge. With New York, they could have two or three operators. I understand this, but we are metropolitan. We are not urban, so we are already used to working with 50 or 60 operators. No, it's not a problem of the number of operators for us, the problem is the operator that doesn't meet the requirements.

HT: What is your approach to the use of inactive services? How to improve quality and costs.

LAV: Are you talking about the tendering process?

HT: It would be political to find them, or did you have a longer relationship with a certain operator? How do you see that?

LAV: Regarding the operators, there are two types: railway and road operators. For road operators, I think there should be a certain amount of time. More or less logical. It could be ten years, eight years, 12 years. It depends... Around there seems to be a sufficient amount of time to amortize their investments, but the focus of the contract should be on having conditions of bonuses and penalties. In this way, their performance can be evaluated in different quality

indicators. It's important that you can't just leave the complex once it's approved and that's it. There has to be an analysis every year of how it's functioning, and you should be able to reward or penalize them according to their performance. Even though the contract lasts ten years, there should be a moment in the middle of five years where you can expel operators who have failed to comply with certain indicators.

HT: But that doesn't exist at the moment?

LAV: No, there are bonuses and penalties, but they weigh very little. There are some, but I think they should be more demanding.

Speaker 1: And the operators also change frequently, and then the contract ends.

LAV: Well, there are cases where they do and cases where they don't send it to tender. What I think we need to avoid is selecting the cheapest option. Economic factors should have a small weight, and the quality and the fulfillment of that quality should have more weight.

HT: Interesting. Okay, okay...

LAV: Because this is about providing a service to people...

HT: Yes, yes. How can we improve cost efficiency?

LAV: Cost efficiency?

HT: If there are possibilities to save costs and, on the other hand, create new income streams?

LAV: Improving cost efficiency is essential, for example, on the surface, buses must have dedicated space. Bus lanes, as we call them, on all roads where there is congestion. But with well-made bus lanes. Three and a half meters wide. There are studies from South American universities, especially from Chile, which demonstrate that there are certain actions in public roads, such as the location of stops at a certain distance from the traffic light, which help to improve efficiency and therefore save money. Here, it is difficult to do these types of things, and I believe they are good. We have bus lanes here, but they are narrow. The stops are placed based on not bothering the neighbors, and this greatly affects their performance, right? This is a possibility to save costs. I think energy presents many opportunities. With electrification, over time, buses have much more economical mechanics, have fewer breakdowns, and electric energy is cheaper, in principle. Therefore, a great opportunity appears in the medium term, as we are still transitioning. Regarding labor, it is more difficult because the most important cost is the drivers. Well, we'll see autonomous vehicles, which will arrive in the rail system without a driver, which is more expensive, the railway vehicle. I think we will move to autonomous metros, and therefore there will be savings in labor. But there is not much that can be done in the transportation system if you have a good transportation system; it is already difficult to lower costs. Another thing is income. Income comes from tariffs that we believe should come from congestion charges, like in London, for example, or Milan. We believe that France has a good transportation system. We believe that there are two models that we have been studying. Politicians do not dare to apply them. One passes on parking, as there is in England, or a tax on low-emission

zones or this type of thing, or the transportation export seed from France. I think these are good systems, but there is fear from politicians to apply them.

HT: So you think that subsidies could be increased for public transport?

LAV: The subsidy?

HT: In general, the financing of public transport services?

LAV: No, I think the percentage that we have right now here is correct. It seems pretty accurate to me, with other sources of income and subsidies.

HT: Other sources of income, there are others?

LAV: And others, income, subsidies and whatever. I think that passengers or we have the opinion that paying an average of 35% or 40% of the cost is correct. More, more, more, 50% we think not. But it's an opinion. Obviously, it's an opinion. We think that the administrations must contribute to part of the cost, because it is a public service. Then another thing is how to distribute those fares. Obviously, we believe that an important part of the fares should be social. Therefore, there are people who do not pay and therefore we believe that there are people who pay more than 40%, who pay 60% so that the 60% pays for what the others do not pay. And that averages out to around 30%.

HT: And so we have ten, eleven, twelve minutes left and four or five questions remaining. Let's talk about pricing policies too, the prices, and how you ensure that public transport is attractive to users and how you determine the prices. What do you think of the ticket offers that exist?

LAV: Look, right now I want to say two things that are different. First, in general, people who cannot afford public transport should be helped to pay for it.

HT: Are there any such aids?

LAV: Here we do have aids and they go to the unemployed, the elderly, and minors under 16 travel for free.

HT: Okay, okay, are these all-different types of tickets?

LAV: But then there is an important part of the population who must pay for that service. So now we have a flat rate in urban areas. It's the same price no matter what you do for a certain period of time, not just for intercity travel. We have coronas, and I would like to change even the urban areas to a flat rate. But nobody agrees with me, so I must not be right. If the flat rate remains in urban areas, that's fine. So there is a social tariff and a flat rate in some way. But for intercity travel, we are working on moving to a kilometer-based system. There will also be subsidies for those who cannot pay. This is always the case. But we believe it would be fairer for people to pay according to the kilometers they travel, and we are already developing it. We haven't applied it yet, but it will be up and running in a couple of years.

HT: Because I also lived in Barcelona, I know a little about the system and how everything works. Why isn't there an annual ticket or a yearly pass?

LAV: No, there is no annual ticket. There is a quarterly ticket.

HT: Why was that decision made?

LAV: I don't know. I don't believe in annual tickets. I think tickets are a strange thing. People have different needs throughout the year. So in the summer, they go to other places where they have other fare systems. And well, then they pay for an annual ticket. I don't see it. I don't understand why. That's one thing. I don't believe in using fares to manage demand.

HT: I see, I see. So you think that tickets, and obviously tickets that help people with low salaries, are quite good. It works well...

LAV: It doesn't work badly. We want to make changes because we want fares to shape demand more. For example, we don't have peak and off-peak prices. We, as technicians, would like to do it, but politicians won't let us.

HT: I see. Okay, okay, okay.

LAV: But we believe that peak hours should be more expensive than off-peak hours because there are a lot of people physically moving during those times... We surveyed a lot more people who take peak hours because it suits them, but they could go during off-peak hours... And of course, we travel empty during off-peak hours and fully packed during peak hours.

HT: Interesting, because I talked to someone from the authority in Zurich, and they also have a ticket like that to reduce demand and... He told me that it doesn't affect... It doesn't make much of a difference to demand.

LAV: No, it's true. But if it reduces even 5%, that would be a lifesaver for me.

HT: Okay, okay.

LAV: Yes, of course I know that. Because the parents who take their child to school, if the school start time doesn't change, they won't be able to take the child an hour earlier to school because it will cost them money to pay for daycare. So that's obvious. We're talking about... not moving everyone. We're talking about moving a small percentage. If it reduces the number of people during rush hour by 5-10%, then that's fantastic for me.

HT: Okay, perfect. Let's continue. We've talked before about where we are. The promotion of financing subsidies or passenger income. Okay, we've done that. What is your opinion on subsidies? How do you see them evolving in the future?

LAV: They will become more personalized. They will be personalized. That is to say... With the new ticketing system, we will be able to do post-payment. We can pay after using it. Therefore, I can know what people have done, at what time, what problems they have had, and where I can make rates... Much more customized. That is to say, if I break my leg... And I can't go right now. It's not covered. I don't have any service, nothing that can help me say, "Hey, how did you break your leg?" This person should be considered disabled and therefore I have to lower their price. I will be able to do this. If I am sick for 15 days, I can give a paper that exempts me from paying for public transport for those 15 days. No, it needs to be personalized.

HT: Interesting.

LAV: This gives more work to the administrations, yes, but it's what people demand... What people will demand in a personalized future.

HT: Interesting if so. Do you see any disadvantages or problems in the subsidy process?

LAV: No, no, I think this is a social issue, not a public transportation issue. And I accept it. What I would like is what I'm telling you, more, more, more adapted and clearer. But it was not possible with the old ticketing system we had.

HT: Okay, understood. Last question: What are the current long-term goals of ATM and how do you see it evolving over time?

LAV: The authority's objectives?

HT: Yes, or the current long-term objectives of the authority to improve public transportation. We've mentioned it several times...

LAV: Yes, but right now our fundamental objective is to reach every territory equitably. We have difficulty reaching low-density areas. We are working to improve access to areas with less public service. Integrating mobility systems with public transportation, integrating bicycles, carpooling, and all of this. We're working on a MaaS project for two years. But it's about integrating services. These are two certain objectives, and then environmental objectives. Climate change and pollution are two issues that are currently at the forefront of our project.

HT: And what do you think? Are you happy with the progress? Like the pace of change, how things are improving?

LAV: No, no, I understand what you're saying. No, it's not a matter of fundamental financing, of money, of investments. We went through the crisis of 2008, which lasted until 2014, and we picked up again. Now it's 2020, and we're in 2023 and we're still in crisis. We have a very important problem. So the transformations are delayed a lot. And then we also have to change our structures with digitalization, teleworking. We have to change the human structures, how we work. And this is also costing us and it's costing us a lot of social change.

HT: It's already 12 o'clock. Well, I've finished all the questions. Thank you very much. And when I finish my thesis, obviously I'm going to send it to the colleague, the person I was always in contact with, and I hope he also advances the thesis. So you can...

Interview information

Date and Time: 27.04.2023 – 2:00pm

Location: Online – Google meet

Interviewee: Alexandre Santacreu

Organization: EMTA – European Metropolitan Transport Authority

Position: president of the association

Initials of names

HT: Hannes Terzer, the Author of this paper as well as conductor of this interview

AS: Alexandre Santacreu

Interview transcript

HT: Okay, this works, perfect. So, you already received the questionnaire, so you have more or less an idea of the topics we are going to discuss. And yeah, briefly describe your professional position within your authority and also maybe in your case, more interesting, your path, your career path. What have you done? Which experiences have you experienced? Yes...

AS: Right, so I am leading this association called EMTA, that unites public transport authorities. So, I'm very special case in your interview round. Sometimes I might be able to speak on behalf of authorities. Sometimes, I mean, most often I will just give you my personal opinion, on what's happening in public transport authorities. But to get back to the question, my background is in urban mobility. For more than 15 years I've done, how to say that... Transport demand modeling and planning at the Ministry of Transport in France. I've done mobility surveys. That's true. Household Travel service. Then at Transport for London, I did a lot of data science and KPIs to manage mobility and public transport, but mostly transport for London is more than a public transport authority. I would call it a Mobility Authority. Mobility organizing authority. And then at the OECD I was in charge of urban road safety and some big data applications in urban mobility.

HT: Awesome.

AS: Yeah. And now I'm leading that association of public transport authorities.

HT: So since ever you, I've always worked in a field which has to do something with public transportation or mobility or...

AS: Yes, never hard-core public transport, because that's a profession in itself. When you think of all the skills involved in contracting, public transport services, tendering and the operation of bus fleets, metro trains, etc. I was never right in that precise field. But always, you know, in urban mobility.

HT: Okay. What would you then say are in general, the main characteristics which define a well working and attractive public transport service.

AS: So how to say it's attractive, and well working... To say that you need to look at modal shares. But perhaps there is another way to say that. You need to look at who uses public transport of these captives or are these people will make the choice. And the choice to leave their car at home. That would be the only way of responding to that question. Otherwise, you would need to look at 20, 30, 40 indicators of quality of service. Why not? It's a good exercise in itself, but it would be a very long way to respond to your question. And thirdly, transport is really a multifaceted...

HT: Sorry just one second... So, coming back to your question...

AS: So, I think I was finished with my response.

HT: Yeah. Okay. So, in general, you would say the main thing is, the modal split... People who are choosing to take public transportation.

AS: No, this are two ideas... Sorry, modal split is like saying, okay, 40% of trips in that area are done by public transport. It's a good score. We could do better. We could monitor that. But to respond precisely to your question, is the service interactive? You would need to survey the users to know whether they are captives or whether they are making the choices.

HT: What would be a public transport role model within the European Union and also Switzerland?

AS: So, no, I can't really answer that because every we authority is doing some, some pioneering work on one aspect at least. But personally, I really admire transport for London. Uh, but part of it is due to their governance, the powers they have. They have the luxury of having many more powers, many more responsibilities than the others. And so, with those powers, they of course they do fantastic things, but that the others could just not even dream of doing.

HT: I was interviewing also, so I was having the guy from the ZVV and also from Barcelona. And Zurich was mentioning actually, that, that they also admire on how many responsibilities and how much freedom of choice and the authority in London has. So this is one of the main characteristics, no, that you have one entity which is in power of many things. That was also a complaint from the Barcelona one, that they are just planning the service but not actually, further steps are taken by the various governmental entities.

AS: The worst case, there are some cases of terrible fragmentation in places. You have the urban busses managed by one PTA and this suburban bus is managed by another PTA. That is terrible. You have in many instances where PTA do have no control on the streets whatsoever. So, imagine the problem to the best priority. Or bicycle parking or anything. It's very long

conversations with municipal authorities. And that can take decades. Whereas we wish public transport would grow out.

HT: So, you would also say that a very strong public transport authority is one key element of a good management, good public transport management.

AS: Yeah, it enables good management. So, it could be by giving it more powers. Sometimes it is giving it more money. Because with money you have some political leverage. You know, you say, okay, sure, you can speak to a municipality and say if you agree to work with me on bus priority and this and that, then I will subsidize. I was funded 50% and you will get new streets, new flowerbeds, new... So, money helps.

HT: What would you say are some key metrics or key performance indicators to measure public transportation? Like the efficiency of it, the quality of it.

AS: So that is something we are trying to do in the EMTA barometer. But as I said earlier, the level of service, is really touching on many topics, to make the list of those topics, every PTA should do customer research. Otherwise, we would work on, say, travel time and people care about their safety and security. You see, we risk working on the wrong topics, if we don't do customer research. Mm hmm. The problem with public transport is that sometimes it's managed as a as a public service, as a municipal service. And we're trying to get new customers who are just trying to do the basics a bit like we manage schools and hospitals and... And it can be a problem because people perceive it as as not well managed. Not attractive, not competitive. So, yeah, I find it good that many PTAs focus on growing their readership, showing that they care about customers, Customer choice. Customer. Attracting new customers. But the indicators. No. The list would be too long for this conversation.

HT: Just maybe. Maybe one, a few, give me three important ones...

AS: The modal share of public transport. Actually, public transport and active travel together. Because you see, Dutch cities, public transport is not very big as much. But if you add up with walking and cycling, you realize that sustainable travel as a whole is competitive. It's just that people cycling instead of taking the bus.

HT: True, true, yes

AS: So, mode share... Well, perhaps the cost. The cost per passenger kilometer. That's interesting. Because that's. That's the evidence that we are making efforts to minimize the total cost of running the systems. The passenger kilometer. It can be a bad indicator in a sense, because sometimes when you improve, when you switch from busses to trams or from busses to metro, your cost per passenger kilometer might go up. It's paradoxical because you have fewer drivers. But all the other costs only other costs rail safety, rail equipment. So big, that you actually increase your cost of running a network. So, this costs per passenger kilometer, is important, but it can be misleading. It should be handled with care.

HT: Have you? I don't know. Have you checked? I did like my evaluation based also on partly on EMTA, the EMTA database, but also partly on research I did myself and I measured some key performances. I didn't know. Did you have a look? Maybe. And it is very difficult to tell

out of the blue. Like they always need to be very considered inside the context, those comparisons and also, yeah, what you just said... Exactly. Because you live at the moment in Paris. No?

AS: Yeah.

HT: Funny, I was also like two months ago, the first time in Paris. And the results I had from this evaluation was that Paris has one of the most expensive networks like per vehicle kilometer. And I think this is due to the as you said, because of the rail, metro system. The suburban train.

AS: Yes, in the Paris system, rail is included, rail is under the authority of the PTA, which is not very frequent, and rail is very costly to vehicle km of course. Sometimes people look at occupancy. So passenger kilometers divided by vehicle kilometers. Why not? But then people would argue for. What's the vehicle? Do you count the metro as three vehicles? Do you count to train as five vehicles... Which is an never ending conversation. I'm not a big fan either. I talk with another barometer, like network, called BEST. And it's a club of Nordic cities. They run indicators just like the barometer. And on their side, they do not have a favorite indicator either. They have a large set of indicators.

HT: Okay. Very nice. Okay. The next question would be and we'd be more for if you would represent PTA, but that's not the case. So, what do you think are the biggest challenges in managing and coordinating a PTA?

AS: So, I'd be tempted to say challenge number one is the politics because it changes every five years or so municipalities, it can totally contradict the politics that was there before. There can be different levels municipalities down below all disagreeing with each other and with the overall type of politics. So, the politics are a big thing to manage. Uh, second, this is the funding. Since the pandemic, the economics of public transport have changed. Just once and for all. Those economics have changed because we have either fewer passengers, or we have in some cases passengers who came back. But that's at the expense of the new metro, a new a new network of luxurious busses and a new, a new discount for like half-price tickets. So, when people come back, it's at a great cost. So, you see the economics have changed forever. And that creates a new funding need for good for the years to come. So that's a massive trouble on the agenda of the PTAs. And the apart from that now, I mean, there are European affairs that entities helping with, you know, in order to minimize the any negative impact of European rules on PTAs I might sound negative here, but that's for the simple reason the European Commission has very little expertise on urban affairs. Because the European Union is a club of countries and those countries, centralized countries, sometimes they have no clue about urban affairs. So, we need to watch carefully for urban initiative, on mobility initiatives coming from the European Commission. Well, don't quote me on that? But it's a point of attention for good reason. And sometimes we need to do a lot of education. What's a PTA, how does it work, what are the constraints, the difficulties, etc... I'd say those three things.

HT: Okay, perfect. Perfect. Yeah. Do you think the organizational structure of the PTA could be improved, but would it influence quality and costs? Yeah, I mean, the optimal. The optimal what would be the optimal PTA look like, to have like the service itself have the least cost and to the best quality? How would the service of a PTA look like, structure wise?

AS: Hah! So yeah, if you're talking about costs, we should probably talk about competition. There is a divide across Europe, across the north and the south, between PTAs that tender everything and PTAs that operate with municipal companies or in-house. And I find it hard to believe that in-house operations can be price competitive. But there are arguments in favor of enhanced operations for specific things. Like the London Underground. Is operated in house. Why? Because you have assets. There are a lot of assets. Trucks, signaling, stations, depots, that operate very closely with the running stock and the staff and the daily operations. It's very hard to separate those two and to say, okay, every seven years we get a new, a new management, a new, new staff, to operate the metro. It would be very complicated to do. And so perhaps TFL has found the compromise here, because compromise, because they tender to their busses, they have 10 or 20 lots. They brought down the costs of bus operations very much down the road. And, of course, the wages are down. But, from the point of view of delivering a public service that is affordable, that's a total success. Then I worked at TFL. I remember there were many problems with the in-house staff on the ground. The problems you see with the in House companies. But overall, it is such a fragile system that it was this much safer option to keep it in house.

HT: Would you say then it is easier to maintain quality with not tendering and keeping it in-house or direct awarding, basically.

AS: I think quality you can do either way. But costs is obviously lower when you tender and make it competitive. But my only caveat was to be careful about those most complicated networks such as the Metro that is 150 years old and things like that, things that are heavy on the infrastructure side.

HT: Okay. Okay. That's a good one there.

AS: And that's just a personal opinion and discussion with colleagues. It's not at all somewhere something we would state anyway, because there is no consensus, as I said. Europe is divided. Every PTA is doing their own thing.

HT: Yeah. Then here, partly we already are responding to this question. Do you think the number of operators has an impact on the service.

AS: The operators, what do you mean?

HT: Operators, I mean like the operators can be tendered operators or a direct awarded operator. Basically. Yes. So, more tendering versus, or maybe and bigger operators versus many small operators.

AS: I have no opinion on that. No, no, no. It's okay. Quality is achieved by contracts. The terms of the contracts, the KPI is the way it's monitored, the way it's audited, the way it's implemented, like in Brussels, for instance, has, kind of in-house municipal companies doing all the busses, trams and metros. And so, they do they do a contract every five or ten years. They do a contract and depending on how good they are in setting the terms of this contract, the quality of service for people will be, will be good or bad. So I don't think the number of operators kind of operate has anything to do here depends on the contracts, the carrots and sticks and things like that.

HT: Yeah. Yeah. Yeah. In the end, it's also a question of, uh, which is this specific case, which is to this specific service area. And then, of course, for maybe a larger city, it would make sense to have one big operator. But then for smaller areas, maybe also just one, but then for the whole area would be many. Okay... I get you.

AS: In London, transport for London has as I said, 15 plus lots for its busses. So, these are different operators in the same district, in the same street In London. You could have two or three operators running busses. That's fine. That's transparent to the users because the PTA is a strong one. It does the marketing, the ticketing, uh, the branding. Everything is done by the PTA. So, it's totally transparent to use them.

HT: Would you what would you think is a similar PTA in Europe, which has this power, as the London PTA has?

AS: Hmm. I don't. I don't know any, to be honest. And it's a long path to gaining new powers. Yeah...

HT: Okay. And that's, we had that already. Okay, here's the approach to tendering. We also partly discussed this and how we would more or less, or more aggressive tendering improve the quality and the costs. As you said, it depends on the contract.

AS: So, for quality, as I said, it just depends on the contract. For costs. For cost, yes. That's where tendering is important because tendering is competitive and tendering. The weakness of tendering is when you have only one response or when you have two or three responses from the big brands that divide up divide of the world. So don't quote me on that. I mean, I don't have a conspiracy theory on that. But in situations where tendering is probably not working is when you have to little or to few responses. So to prevent that situation, there are many things that PTAs do. They try to remove the barriers to entry. So, by having smaller locks, it's kind of removing a barrier for smaller operators. So that's one thing. That's why the Paris Bus network is currently tendered in smaller lots. What else? The barrier to entry would be capital. If you need to operate. If you need to buy your own busses, build your own depots and everything, that's a big barrier to entry. Mm hmm. So many PTAs are in a transition towards ownership of depots and ownership of vehicles. And where that's not the case or where that's not possible. Sometimes the central government is setting up a running stock leasing company or things like that. So that's the new entrant and just lease vehicles. Mm hmm. So this is a long list of things to do to make your tenure as competitive as you can.

HT: And because you mentioned the Paris network. How's it organized in Paris? Isn't it divided by a few big operators?

AS: So far, much of the bus services, much of the bus network in Paris was operated by RATP with the monopoly. And that's going to change. That's why lots are being created that did not exist before.

HT: What do you think in general of the in the Ile de France mobilite. So, the PTA of Paris.

AS: Where they are, they deserve a lot of praise and respect because over one- or two-decades different names... But they have transitioned from being a tiny organization, that was simply

the... what's the word in English... the thing that redistributes money when there is a fair integration between operators... The clearing house... It was just a tiny clearing house at the beginning, and it has become much closer to a true PTA that does the marketing, the ticketing, the planning, the funding, the tendering, and everything.

HT: The, yeah, exactly. The contracting... etc....

AS: And so, it's gaining a lot of power every year, slowly, but it's on that path. Plus, it's exceptional in Europe because it runs a lot of trains. It will soon be exceptional in Europe because it's going to have the biggest metro network as called by Grand Paris Express, what else...

Speaker 1: How many operators are there at the moment... So, in Paris you said you had the RATP...

AS: The RATP, SNCF. And then some smaller ones for suburban bus routes.

HT: Okay. But it's not because from my research that's funny that you mentioned it because, I somehow... oh where do I have this... I thought for the suburban busses in Paris. You have one big operator...

AS: Optile

HT: Optile, yeah, exactly

AS: I'm not sure this one. Operator. It could be a federation...

HT: Okay, Good one. I will, I will investigate this a bit more.

AS: This is indeed significant. But in quantitative terms, it's probably a tiny fraction of the bus kilometers. Okay. Because it's very suburban...

HT: And how would you ensure that public transport system, that the public transport system is attractive to users? How would you determine the pricing policy? And how could you incentivize the usage with special tariff settings?

AS: So, I would jump straight to the pricing because the attractiveness depends on 20 plus, many, many aspects. That market research can help us know. So, for the pricing. If you do public transport economics, you can compute the optimal price of public transport optimal to society. And that means that computation, every person taking the personal network should only pay for the marginal costs they impose on the system by being on it. A little bit for the extra seconds that everybody will lose on the vehicle when you board. A tiny bit for the cleaning of the bus, a tiny bit for the extra fuel you cause by your own weight. So tiny, tiny, tiny things. Those things are not so tiny when you add capacity. When then the network runs of capacity. The marginal costs are imposed on the network is actually significant because. Checking the network will mean that there will be platform upgrades or train lengthening new networks that need to be built, etc., etc. and that's very hard to compute. But all that is to say subsidies are totally legitimate about too much from a transport economics point of view because public transport reduces congestion, because public transport becomes just more economically viable

as more people use it. Uh, for all those reasons, it is sad to say to have Users pay the 100% of the cost. So, across Europe, subsidy rate is about 50%. 50 or 60 %

HT: Depends, yeah...

AS: And that has changed since COVID. And that is not shocking at all. It's well known for many years. And from an economic perspective, it seems totally fair. In a world where car traffic would be taxed properly, taxed to the true level of its externalities, then perhaps we should stop subsidies to public transport.

HT: Yeah.

AS: That's not where we are. We are far from that world. So...

HT: What do you think of free, fair public transport? And also, because you mentioned it earlier, are there any examples of where user need to pay 100% of the costs that come up for the service? Where, it's not subsidized. Do you know any?

AS: Oh, okay. Places where it's not subsidized at all. Uh, to be honest, no, I don't know any, uh. And that's a good question. Places where it's free. Yes, it's this is a trend that is developing like Luxembourg. Public transport is free. Yeah.

HT: What's your opinion on that?

AS: I feel like it's a mistake or mistake because you need to continue having ticket machines and ticket inspectors for people who are not residents. Okay. Because for some reason, many of those policies are only for residents. Oh, it's the loss of revenue that you could invest wisely in network expansion or in evening services or better-quality services, whatever. Uhm. So, it's very hard to understand and to defend such policies. We have no other choice but to respect the local political decisions made. But it is, not something that we promote in any way. What we could promote is, of course, marketing operations like three months, three or one week trying on for free transport, about, you know, like you have an Amazon prime trial for a month.

HT: That's a cool idea, I like that.

AS: Yeah, that's something Germany did last summer with nearly free public transport.

HT: The €9 ticket all yet.

AS: With the problem that trains were overcrowded so it can reinforce the image that public transport is for people who can cope with crowding and poor service and things like that. So, it's a bit sad. But marketing operations are also very legitimate, and they probably work. But the long-term decision to make it free. I can't understand the benefits, really.

HT: Okay. Interesting. Shouldn't it be the goal, to, so the ultimate goal is not to shift as many people as you can from individual car traffic to public transport. You would say?

AS: Because those policies don't work for that. Because the price we call it the price elasticity. It's not it's not very big at all. Yeah. Yeah. Every commentator will tell you that on this topic.

And in Germany, I think there was an evaluation of the benefits of the nine-euro ticket last summer. And the mode shift... There was some mode shift, but compared to the cost of the measure, it puts the price of carbon very high. Okay, nearly ten times higher than the market price of carbon... So. Yeah. Price, ticket prices should not be seen as an issue in public transport. It's often too cheap. Most networks are underpriced. And if you care about making it inclusive, I care about making it inclusive. And we should all care about that. Then there are social tariffs. They exist.

HT: What would you say are networks where the price in your opinion is appropriate and where it's too cheap and where it's too expensive? Just drop quickly some networks.

AS: Oh, I think yes, Prague has problems because the politicians keep the fares very low for many years. And now I think it's somewhere between ten and 20 year or four months for unlimited in prime. And that's a problem because they would never catch up with reasonable prices. You know, when you increase, if double the price of a public transport ticket, you risk riots. Yeah. Yeah, true. You know, the city of Lyon is my best example. They increased the price in line with inflation for many years. They have a ticket price that is not far from that of Paris.

HT: Would you say Paris is okay?

AS: I think Paris is underpriced still...

HT: Okay. Interesting.

AS: And London Is very expensive.

HT: What about Amsterdam? I think it's also...

AS: Amsterdam is special because there is no such thing as an integrated pass. If you buy a monthly pass in Amsterdam, it's for your favorite line or your favorite section of the city. So, it's not possible to compare properly with the others...

HT: I'm going to have an interview also with the Amsterdam PTA on Tuesday. So, thanks for saying that. I will mention that.

AS: Mm hmm.

HT: And regarding special tickets and yearly tickets, do you believe yearly tickets are working? Or like, you have transport systems where they have the check-in-check-out system.

AS: So yearly tickets, there is something good with yearly tickets. How to say that... It makes you loyal to public transport. You know that every weekend, every day of the year you have free public transport. I mean, zero marginal costs for your public transport, so you're more likely to leave your car home. And whereas if you do pay as you go, then at weekends you might think, oh, let's use my car. It must be bored in the garage. And my electric car costs me nothing as a marginal cost. To go for the ride at the weekend. So, I'm a big fan of monthly or annual tickets for that reason, for the mobility management dimension. But there are very good arguments against. TFL tells me, annual tickets and monthly tickets are good for the middle class,

but many people who have financial troubles, they cannot make the upfront costs or commitments. For that reason. Pay as you go, with price capping is much better.

HT: Price capping, you mean...

AS: That's what TFL does. DFL now, almost stopped. I mean, their monthly tickets and their annual tickets don't sell anymore. Because people preferred the smart price capping. So, they pay as you go. And if they go if they travel enough, then they unlock as they go the monthly fare and they don't pay anything anymore after that.

HT: Yea, they are trying to the same thing in Zurich, the guy from Zurich told me two weeks ago. They also have this new thing. Check-in-check-out system. And it always gives you the best price.

AS: Well, I think one of the good things for attracting customers is to show that we care for their, their needs. We, we, we make things fair, honest and easy for them. And that a smart ticketing system like that makes people love public transport. That's what I regret in Paris, that things are very complicated. Ticketing is a mess, and that's not making people really love public transport.

HT: True. I remember I had to... Everybody told me, get ten, ten rides. That's perfect for a long week. And then you get to ten rides, and you get ten of the small things here. And, funny and interesting... And how much time do we got left?

AS: Two or 3 minutes.

HT: 2 or 3 minutes, Okay, Okay. Okay. So, I have four questions left. Let's say one minute per question. Should the funding share of subsidies or passing passenger revenues be changed, what would you think is the optimal ratio between those two?

AS: I think 50/50 sounds fair. Totally fair. Without COVID, we could have aimed higher. But now that the public transport economics have changed forever, uh, 50/50 would be already a fair separation. It tariffs, totally depending on context, but that seems totally honest.

HT: Okay. And the majority of PTAs is in Europe it's way less...

AS: After COVID, many PTAs in Europe have a fair coverage below 50.

HT: Let's quickly go to the next one. Okay. What is your opinion on subsidies? Better: How will they evolve in the future?

AS: Well, right now they are going up by necessity just to keep the services running, to keep things alive. But if fares go up a little bit, that might just rebalance the system. But politically, that's a challenge.

HT: And okay. Do you see any drawbacks or problems in the subsidizing process? We have already partly discussed that. Or do you...

AS: I would like to perhaps to add that subsidies could go up for legitimate reasons like, we have, we are in front of a climate emergency. And so, if we are serious about that, that totally deserves some extra funding.

HT: Would you say also this extra funding could come from taxing, as you said earlier, and individual car traffic, parking, etc.

AS: So, yes, any source of funding is good to take, but my favorite would be road pricing.

HT: Last question. What are the current long term goals of the public transport in general, and how do you see it involving over time?

AS: So the long term goals depend on the politicians. Yeah, setting those goals for the PTA In many places in Europe, it's about mode shift. Like London has a target of having 80% share for public transport, walking and cycling. 80%.

HT: Crazy.

AS: But some. In some places, the politicians are much more quiet on long term goals. They won't. They want financial balance of a public transport system that doesn't cost too much. And subsidies. Yeah. So, it varies greatly.

HT: What do you think? What is your personal opinion? How would that involve very dependent on the country, or will there be a general trend?

AS: I think it will depend on the country necessary.

HT: Okay. Okay, So that's it. I finished all my questions.

Interview information

Date and Time: 03.05.2023 – 08:30 am

Location: Online – Microsoft Teams

Interviewee: Ingrid de Bruijn

Organization: Vervoerregio Amsterdam

Position: Deputy manager of the contracting department and strategic advisor

Initials of names

HT: Hannes Terzer, the Author of this paper as well as conductor of this interview

IdB: Ingrid de Bruijn

Interview transcript

IdB: Yes, we are at the office in Amsterdam. We have an office in Amsterdam and I can just I can start talking about, we are the transport authority, we are in cooperation of 14 municipalities, including the municipality of Amsterdam, and we are responsible for the tendering of the public transport contracts and also for the maintenance and extensions of the network and also for the cooperation between the municipality about bicycle use, traffic safety inclusive public transport, and also to more, to make the whole region more accessible and more reachable. That's where we are.

HT: So that's like in general, you are, responsible for the mobility planning, not just public transport, but also like, as you said, bicycle lines. Roads, parking as well, these kinds of stuff?

IdB: Just one moment, because I have to change the network connection. We are in a new building where we just moved, and our network is continuously... the network disconnects continuously. Okay, I put my hotspot. Most of the times that one works better. Yes. That's good. Well, we have a better connection. Otherwise, I knew you just. I'm gonna. I'm gonna here you...

HT: Okay. Okay.

IdB: Yeah. We are responsible for tendering the public transport contracts as our main, main goal, our main task. And that's why we are receiving from the national government every year from these 450 million euros. And we are not receiving any more money from others, not from taxes, not from the municipalities, we're just receiving 450 million euro a year from our national government and that's why we are only tendering the contracts on we are also responsible for the safety of the public transport, the maintenance, extension of some lines. But that's it. So, there's not a tax like you'll have in London or something where they are paying from the tax of

car use to or the parking fees for introducing more public transport. That's not we don't have that possibility. So that's good to know. I think it's.

HT: It's very good to know because it differs actually everywhere. It's quite individualistic. And I was thinking, okay maybe okay, I ask you two more questions then maybe I will continue with the question that were otherwise I get lost. And so, you're not... So, you are only responsible for public transport, but also, as you said, bicycle lane. So are you in general mobility agency for those...

IdB: We are more mobility agency... the municipality are responsible for building the bicycle lanes and for traffic, say, but we are supporting them with some subsidy, sometimes 95% where they have connections between the different municipalities to make the whole region more accessible for a better economic profile, for accessibility of all of the working places, improving the connectivity between the different municipalities and different housing areas, that people are more connected and more able to work who are able to go and yeah to live.

HT: So, so you are basically not completely responsible. So, at the end it's always the municipality deciding, but you rather...

IdB: Except for public transport, it's our responsibility. We are tendering the contracts, we are responsible and our... we have a board, we are because we are a corporation of 14 municipalities, we have a board who are making the decisions, the operational decisions, they are the three, the three political, the highest political people in three from our 14 municipality. Oh, there is also a council, a board, and they are making the decisions about the budget, about some other things. But in the end, we are as a party, we are responsible for the public transport, we are tendering the contracts and we maintain the contracts.

HT: Also planning, as of course planning everything. The lines...

IdB: Yes. Okay. And that's something else, what is different from the rest of Europe. We are, we have contracts, we have net contracts and what is different. So, we have concessions, so that the operator is responsible for the whole, the contract and the whole concessions are not by line. We are not tendering the lines, we are tendering areas and the operators responsible for the revenues. So, we don't have a role, not like TFL, TFL is a good example for this. They are organizing the whole public transport by themselves. They are making decisions about where are the lines, they make decisions about the marketing, the passenger information fares and stuff. No, we are telling, we are saying the operators responsible for the revenues. So, they are also responsible for making the whole timetable, for making the communication because it's their responsibility to increase the passenger revenue and they are responsible for that. So, they are also responsible for the whole operation.

HT: You have, how many operators?

IdB: We have right now, we have till the end of this year. We have four contracts... and the Amsterdam region isn't that big. Yes. Have you ever been in the Netherlands?

HT: Yes, actually, 2 months ago, I was in Amsterdam.

IdB: Okay, now, we are not that big. We have now till the end of this year the Amsterdam contract, bus, tram, metro GPB. We have the Amsterdam Meerlanden contract, that is the Ship-hole area contract. That's in the south part of Amsterdam so that including five or six municipalities. And we have at the end of this year, we have two contracts in the in the north part of the Amsterdam region. And they will be combined at the end of this year together and that also seven municipalities. And so we have at the end of this year, three contracts but an annual budget for an annual amount of passenger revenues and subsidy around... around €500 million euro, Including subsidies and passenger revenue... That's right.

HT: Okay. Okay. Okay...

IdB: So, we are not that big... The greater London area, for example, is even so big as the whole Netherlands. So, yeah, we are only tendering the contracts for bus, tram and Metro and not the regional rail or not the National Railways. Yeah...

HT: Are you also responsible for the ferries going to Noord?

IdB: No because there is no bridge in between. This, by law, it means that is an infrastructure. The ferries you have to just compare it with a bridge, so its infrastructure for the municipalities. You don't have to pay for the ferry because there was no infrastructure. So it's not public transport.

HT: That's like Netherland special like. Okay. Yeah.

IdB: So our ferries, we have also ferries in the Netherlands where there are bridges. So you can use it as public transport.

HT: Okay.

IdB: Okay. And there you have to pay. I think you went to the lower part of ... I don't.

HT: To Amsterdam north. Like to just... The Above city part? I don't know. Yeah.

IdB: Yeah, but you can just go and just... you have to see that as a floating bridge...

HT: Very cool. Very nice introduction. Awesome. And that's also very important, because with some authorities I instantly start and then it comes up that: We are having like gross contracts, and we are actually just planning... etc.. So very cool that we had this introduction now. Okay. And let's head to the to the questions.

IdB: Yeah.

HT: Please briefly describe your professional position within your authority.

IdB: Yeah, I can. I have just already... We are an authority and here are only working 150 people around that and we have different teams, and I am working for the public transport contracting. I am the strategic advisor and the deputy manager of the team; my manager is Carla and we are as team are responsible for the public transport contracts. Um, we worked for tendering the contracts, we are dealing daily with our operators. We are making proposals to our board, and

I am the strategic advisor and also yeah, I do a lot about all the contracts, A lot of there are questions I answer them. Different questions, I do improve the cooperation between the contracts.

HT: It's the most difficult part now like that. Maybe not the most... Definitely a difficult one, but also the key part. Yeah. In the end. Yeah. If you tender, the most difficult and the part which makes the difference. Very cool. Okay. What would you say are in general the main course characteristics which define a well working and attractive public transport system.

IdB: And yeah, and that is that is something I, and I hope I what I'm going to tell what you what you want to hear or that was what you meant.

HT: I hope I get new input. So please. Yeah.

IdB: Yeah. What We are just thinking. I mean, we in the Amsterdam region we have a very busy area. We are... You cannot compare it... It's a very high density. So, everything is close by, but there are some rural areas, but even there, there are the distances not that far to the city or to that those neighborhoods around. So that makes it easy for us. There are no very rural areas. There are always small villages with more than 1000 inhabitants and the closest villages four or five kilometers away, then we are talking about a rural area. What we always are telling. We have to connect the cities in our region, we have to connect people, we have to connect working places, we have to make it more accessible. And what can you do best? We are we are trying to reach that. People are not using a car and if we are looking to our future goals, we want a more livable, sustainable, economic good region to live in. That's one of your last questions. What we try to do is to connect these places and we are, sure, that... We are thinking that if we connect these areas with a high-quality network on a high frequency very wide, that you can start at six and to 12 in the night or even around Schiphol area 24/7 hours, if you can travel with public transport this really good and then it is an alternative for a car use. Besides its high-quality network, we see that there are different needs for smaller part of the inhabitants. We think, if we can connect these areas where people have different needs, with a more lower frequency of public transport and we're connecting them to the higher quality network. And you'll have a whole network, people can travel everywhere. If you are healthy enough, if you can cycle or walk one or two kilometers, going to the nearest bus stop and you can take down the bus or the metro with a high frequency line, six, ten, 12 times an hour, and you are in 20, 25 minutes at work, and then we are doing great. And that's how we try to organize our network, how we are organizing our public transport, because then you can do so much more with less money. And we think, we have an annual budget record of 450 million, and only 100 million is going to exportation of the contacts or the bus from a the metro contracts, €250 million going to maintenance of the tram and the metro, even the maintenance, but also on vehicles. We really think if you have a high quality network, it is attractive for people to use. So you have more revenues, so you can, from the more revenues, you can also pay the more lower frequency, the lower frequencies that. So that's our thoughts about how to organize, and that is why we are just challenging the operators to organize and network. We have some requirements. We have always minimum requirements in our contracts. You have to connect these areas. But how you are doing, that's up to you because you are responsible for revenues so organize your public transport, just the way you make more revenues at lower cost. That's their incentive. A lower cost, more revenues and you can only reach that when you have a high-quality network, when passengers are satisfied and they want to pay for it and as always, a maximum of fare they can

ask, because we are we are only giving them the index, the only way you can increase the fare is only within the index. So that's how we are challenging. But we really want a high-quality network.

HT: Okay, that's okay. So basically you said, high quality network connection like means not necessarily many lines, but somehow a well-connected network and as well a high frequency. So that's it.

IdB: High frequency, that you can travel the whole day, not that it ends at 8 pm, because then you can go, but you cannot go back. So, you can travel in a very wide time area, and you can just, sometimes in suburb area, yeah 24/7 that's perfect. And also connecting the more the basic lines. So, if you are disabled or something, you can travel.

HT: Is there also some coordination with the National Rail Company?

IdB: Yes. What we're doing with our tenders... We have minimum requirements, but we know where the hotspots of the National Rail place in Amsterdam as a couple of intercity stations and we are always telling. The train stations are the hubs, the places where people are connecting to the National Railway. So, you'll have to connect your lines on the timetable of the National Railways and you cannot connect every direction or every line. But we also we have data about what are the best, the highest, how people are traveling. So we actually have requirements. You have to connect to this, to the national railway line and they are doing that because there is also the incentive if it's not connected anymore, people will change, but people will change their modes how they are traveling. They are also thinking, okay, we have to connect people, so we have a bit of problem and people are coming...The operator has to make a the attractive network so the revenues are high.

HT: So, it's actually very a lot of a lot of let's say... Tasks, you put them straight to the operator, they have to organize themselves.

IdB: Almost everything. And then you can ask, but how are the municipalities involved in the contract. That is always the difficult part, because we are tendering for 10 years normally and sometimes, we can extend the contract for five years that this new with electric busses. When we start the tendering procedure, we are going to visit all the municipalities. What do you want? What connections do you want? What? And that is the moment in our whole contract period. Where they can request something so we can put it in the requirements list.

HT: Mm hmm. Mm hmm. Mm hmm.

IdB: And... After that, it really difficult for the municipalities to make a big change. Every year we are making a new timetable. So there are always possibilities to request for a request, but not for very big, big changes. And then you have to change your contract and that is typical because that is not allowed to change your contract completely. But every year now, some small possibilities of change. But just in the beginning of the tendering procedure, just before starting the contract, they are you there is the municipality most involved to say what they want and how they can do things. And after that it is up to the operator, it's up to them how they organize it.

HT: And how long or since when are you having this approach of with the we do only the contracting, it's not contracting, we put all the tasks to the operators, Was it like 20 years ago a different approach or what was...

IdB: It was since 2000. Then we had a new law in the Netherlands, and there we were telling okay, we have it...I don't know how to explain that... It is just the law about public transport and tendering at that moment the European Union or commission was telling, okay, Public transport must be tendered.

HT: Yes. Yes.

IdB: And at that moment we are we were changing our law. We had before in the whole Netherlands 66 contracts. Most of them are organized by the municipalities, by themselves. But we saw so much money, so much political involvement, not financial entrusting for the operators so we were changing that system, so we change it to transport authorities. We are 14 in the Netherlands. We are tendering the contracts. We came from 56 contracts to nowadays 35 contracts. So, the contracts were bigger, the areas were bigger. So it was possible to lower the costs of making the public transport, better, to make it more connected, sometimes there were just a public transport with a municipality, there were not organizing it with their neighbors and that was the moment we were changing this in the Netherlands, and what we were also changing at that moment because we are such a small country and there were, and because of that and because of the high density of people, people are always traveling in more areas. For example, I am living not living in Amsterdam, I'm living in Utrecht and 35 kilometers away. Yeah, I'm in 45 minutes. I'm in from my own house to the office.

HT: Wow, wow, wow. That's very...

IdB: That's how easy it is to travel in the Netherlands. And that's how can make it possible for passengers to travel without any borders... We have an agreement in all Netherlands about travel information. All the operators are giving the same information on the same time, on the same way. So public transport planners were just an app. They can use the same data and the data has the same information. So, they can make a plan. We have a same paying system. So, there is not, it makes it so much more easy. It's all the same way. So, you're not paying in one area a fixed fee and then the other area you're paying by use. It's always paying by use on the same way. So, you can just traveling, it's much more easier. So, we are we changed that at that moment, and we are working as transport authorities together with each other. Every month I have meetings with all the other transport authorities about these things. We all are... We all know, what we have to do together, to make it better for the passenger.

HT: So, in your personal case: So when you go from Utrecht to Amsterdam, how many authorities are you, like, crossing? Like the area of how many authorities are you...

IdB: Two authorities and four different contracts.

HT: Okay. And for you...

IdB: But I'm going by National Rail.

HT: Okay. Of course. Yeah, okay. So, the also the system within all those authorities or better said, like all those areas, it's organized, coordinated. And you have one national tariff or how...

IdB: Well, we have different fares, different tariffs, but we it's based on the same way. So we have in the Netherlands, we have known we have an OV chip cards and we are changing it to EMV. So paying with your bank card, you can travel...

HT: I saw that. I saw that. I was checking in with my... I was at the beginning: Oh need to find a ticket machine and then I was like with the bank card. Super easy, check-in-check-out. Awesome.

IdB: Yeah. And you can check-in with your bank card almost everywhere now... Or with your OV chip card everywhere. You are checking in. Not by National Rail but for bus and metro, It's everywhere the same. You check-in, you pay a fixed fee about €1,1 and that's fixed fare, the same everywhere. And then you are paying by kilometer. If you're traveling two kilometers, you pay €1,1 and two kilometers by the the regional fare and the regional fare be different. But that is about half a cent or something. 50 cent or 70,5 or 80 cent per kilometer.

HT: Because I remember the I once bought the time tickets you have normally in Amsterdam... Not like 100 minutes or something, I forgot.

IdB: You also have a day card and an hour card and a 90-minute card.

HT: What would you say and what do you think about the pricing? It's also a question we're gonna touch later. But... What do you think about your price policy? Of course, now you have this... let's say it's a form of, like the check-in-check-out of your bank card, that's of course not actually a ticket form, it's more like a way of, accessing the service, no? But what do you think in general of your prices. You have the passenger revenues? Do you think they are a bit too high or is it the right amount? Or is it enough? How price sensitive are people in the Netherlands?

IdB: Yeah, but you are asking now very political questions and I will answer it, of course, that this... We have fares we are paying by use of. And I think public transport is not for free and it costs money. We have the costs of the whole public transport in the whole Amsterdam region is around €450 million a year or something. And if you are saying: People must go using public transport. You have to make it free for passengers. I don't think so... If this. It costs money. We are paying it with tax money from the national government. So that is not free, public transport costs money. So, it is not free, you are paying it in one way or any other way... Or you paid it with your tax or you're paying it by use. So, I think if you want to use public transport you have to pay for it. Of course, you have to think, okay, what is the highest? What is the modest affair? And is it okay to ask that? And. I think the, today, I think a lot of people can afford it. But there are also people who can't... and we as a authority, we are responsible for the public transport and organization and we also want a good public transport. If we are for less money, we cannot afford the high-quality network we want. And if we want to reach our future goal with sustainability, with improving livability. We have to make it attractive to passengers. So, we have to look at what is the maximum price you can ask and what you also have to think: What do we have to invest in the network, to make on the high-quality network and to make it attractive for people that cost money. So, there was always a balance between what can you ask and what can you not. And I think as authority we are responsible for the quality and the network, and we

have to pay for that. So yeah, there must be an amount of money we have to receive from the fares to reach that level. And the municipalities have another role they can look at. They are also receiving money from the national government to, to make public transport more accessible and to make mobility more accessible for people with lower incomes... And they can buy, in other ways, that's possible, some municipalities are doing that. They are paying public transport for people with little income. And I think if you wanna have a high-quality network, you have to invest in your network. And then the municipality has the possibility to improve the accessibility for people with lower incomes, so they can they can buy public transport and they can give it to the people who need it. But so how many people can afford it. And so, yeah, there is always, we have to consider what are we going to do with the fares, and you have to make it attractive. But not for free.

HT: And so, this is... So, you have also social tariffs. That's done through the channels of the municipalities. Also, your ratio between passenger revenues and operating subsidies is quite, as we already discussed, quite fixed because you have your fixed budget. And do you think this budget should be increased, like for you as an authority?

IdB: Oh, well, we don't have... We are not receiving more budget and so we don't have more budget. We have an annual budget for €450 million. And that's... We have fixed subsidies for the operators. The Amsterdam contract before COVID has no subsidy for the exploitation. They are subsidy for the maintenance and buying to invest in the metros and the busses and but that's, that's it and the regional bus contracts were tendered, the Amsterdam contract is an in-house contract. It's good to know that. It's directly awarded to GVB... but the bus contracts, the original bus contract in the south and in the north part they have fixed subsidy. And there is also an incentive for the operator because they have a fixed subsidy. They knew, that at the beginning, during the tender procedure they knew, that they have for the whole contract period fixed subsidy. So, the south part for example, they have a fixed subsidy of €45 million a year till the end of the contract, but they also offer it's a growth of the public transport kilometers. So, they knew, okay, we always have this this size of subsidy, and the passenger revenues are growing... So we have to invest our extensions of the network. Our when there are more passengers, you have to extend your frequency structure to to higher frequencies... You have to make it more attractive. So, they have to pay all the higher frequencies from the passenger growth and that's what they knew from the beginning. And that's also, that is challenging the operators because also there, there is the incentive to make profits is.

HT: Is it so, when the operator knows at the beginning, okay, I'm receiving this fixed subsidy isn't then at a certain point and the interest in increasing the offer smaller? Because when it's like always a fixed subsidy then okay, till a certain degree it's very attractive and then from there on they are covering most of their costs with the passenger revenues and therefore maybe have less profit. Is this the case?

IdB: Yeah. Yeah. And they also have. And we, we, we are looking before to tender because what is, what do we expect with the passenger growth doing the whole parent. We are, we are doing research for that. So otherwise make a higher fix on the subsidy in the north part for example, if you look at the cost coverage, we have a lower cost coverage of the contract in the South Park. We know that. So, we put some higher subsidy. We are doing some... and then it's up to the operator to make a good bit and that's the part of tendering procedure, you know, okay, for the South Park we had fewer operators which were joining in the tendering procedure and the

operators know that from each other, they knew that so they, they want to make a good bid, so they make a higher offer so they have a higher chance to win it then. Yeah, they have to pay the extensions of the growing revenues. But then you're just thinking, okay, they are not... When there is passenger growth, they are not putting it in higher in a higher, better-quality network. They just have more busses with too many people inside. But we also have requirements about how many people can go in a bus. And if people do not fit any more on the bus, they also have, we call a ... That means that when there are people, too many people there, they have to provide a new bus. So, and there's also something the incentive for us or something for us, to say, yeah, you have to extend your network. You have to do something with your network to make that people will fit.

HT: So, it's very, So the contract actually tries to limit this... Negative outcomes which could occur. Okay. Very interesting. Regarding the operators...

IdB: Otherwise, you'll have at the end of your 10 plus five year contract, you definitely at the end of the contract, no one will fit in the bus anymore, because they have to invest in new busses. Well, when there is passenger growth and one day they have to invest in the new busses. Otherwise, they cannot... they will not make it anymore again. There was a moment that operator has to invest. It's the same amount of subsidy and more passenger revenue.

HT: Do you think with your system you're having like the quality... With having a different system or a different contracting system, the quality could be increased. Because it sounds a bit also risky...

IdB: It's possible if you have gross contracts. You have the requirements of the quality, but that's just, choices you'll have to make. There are rituals, 20 years ago for this type of contract, and it was working. It was working. Till COVID. And. But if you have just gross costs contracts. There is no... Then, the other side of the gross contracts is that you can ask requirements about quality and then you're paying, but the you... I think the way we are organizing our public transport is more efficient for us as an authority, for the taxpayers, for everybody. And we have more incentive for increased quality because if the passenger satisfaction has reached... We have national research every about passenger satisfaction. And if they have a high passenger satisfaction, there is always a bonus for them. They know that... So, there are difference quality types... The climate in the bus, how the h bus drivers riding there are different types of quality and there is a bonus for them, for between 500.000 and 1 million euros. So, there is an incentive for them. Also, another incentive. For highering the quality. For improving the quality. And there is always, we also have fines when they are not providing, or they are just leaving too early from the bus stop then there are fines for that. So, there's also an incentive and these fines are high. Also, between 800.000 and 2 million euro. These fines are also an incentive for the operator to ride on time to ride the bus. So, there are incentives to improve the quality. And if you compare this to a gross cost contract, then you're, they just have to ride. That's the only thing they are doing... And this is good, because then the authorities is the organization which is thinking about marketing, about the timetable, that's good. But then you have to organize your authority differently. And we are just here with 150 people and at the public transport contract, we are just with 20 people... And if you want to change that, we have to... if we are going to have a gross cost contract, we have to change our organization. That is good. You have to do that, but then you have to change everything.

HT: Yeah, yeah. That's why also. Okay, so of course, marketing, you are not doing it. Because I see the time is running, the time is running. Regarding the operators, you have now three operators and how do you see like in general your tendering process and also the number of operators. Why did you decide two divided it by three slots and would you think more slots would, would achieve a better efficiency and quality? And also, is it competitive like the process? I mean you have three slots and then only like three companies are applying, or how is it working?

IdB: Yes, we have three contracts its true... I think it's because it's a very small area. You don't have to forget that if you want, you can cycle 2 hours from the North part of our area to have to south part. In 2 hours, you are there. You might be faster, on a racing bike you might be faster. We are very small.

HT: So, it's because of this geographical factor that you said it only makes sense to divide it by these three areas.

IdB: Yes. And also, what we are also seeing and I will also give an example, because till the end of the year, we had in the north part two areas, we are combining into three. And why are we doing that? Because you, see... It's also because the operators... They can organize their networks so efficient, especially because they are running 100% with zero emission busses, electric busses, they can just make up charging point in such specific location that they can make their whole timetable... So, they are organizing like the way that they can, they can charge some time and there are so many relations between these areas. That if you have two contracts, with two different operators. They are not going, they are not cooperating, and they can make more in efficiency network... when you look at it, you really have to look on how you organizing your contract. Because just cutting in pieces when there are no connections. Yeah. Then when there are no connections, you have two different areas, if there are so many connections together, then you can better to give it to one operator because it can make it more efficient.

HT: Yeah. Did you have always headed like this? Three areas to three operators?

IdB: Back from the past. There were more knots in this area and there were always four, in the end of this year three.

HT: Mm hmm. And are there many companies competing for the for these areas?

IdB: We have... in total amount, we have nine operators. We have the Dutch railways from the National Railways contract. We have three. bus, tram, metro operators and they have the exclusive rights, one of them in Amsterdam. The GVB is our in-house operator, RET is the in-house operator in Rotterdam. And HTM is the in-house operator of the Den Haag area. And we have five private companies, operators and they are all the same in all of Europe. We have Arriva from Deutsche Bahn, we have Tramset from Tramset, we have Keolis, we have Cubus, that's an Italian company and we have ABS. That's from... that's an Israelian company. And these five operators are joining all the tenders in Europe, and I think it's the same. And these are the, the biggest operators in whole Europe, I think.

HT: Aha Okay. Mm hmm.

IdB: And they are just tendering everywhere in all over Europe.

HT: Yeah. Mm. I didn't know that. Interesting one. I forgot something. I wanted to go more deeper in it... So, let's check out. So, we did like, cross everything, speak about. Okay...

IdB: Yeah, it's up to you, eh to make a whole...

HT: Yeah, it's up to me. It's up to me.

IdB: I will send you Later. I gave a presentation a few months ago in the Ministry of Israel. I will send it to you.

HT: Aha cool. Maybe this one: What is your opinion on subsidies? How will they evolve in the future?

IdB: Oh, I think. We have, subsidies are good. And that's always a discussion, sometimes with Maas operators or with Flixbus or whatever... I think, we have we have a couple of lines. If you just look at the whole contract and if you look to specific lines, there are lines. We have a cost coverage of more than one hundred percent. So many passengers. So, the revenues are so high, you can just think, okay, why don't we? Why isn't the market doing it? And then I'm just thinking about and... then I'm coming back to why we as an authority, we have responsibility for the whole mobility system in the whole area. Even in the more rural area or the area where people are more disabled. And these lines don't have a cost covered of 100%. Sometimes just only 20%. But as an authority, you are responsible for the accessibility of these areas too. You cannot say these areas, there is no public transport. And of course not. It's not required to have their bus ten, ten times an hour. Once in an hour, twice in an hour. And that's fine. But that's why we always have to subsidize the public transport, because just, even these areas are accessible that people can go to work, that they are not only that they can be reached without a car and not always on every day of the time. You don't have to come by at two in the morning. That's not necessary. But for most of the people, you have to make it more accessible and that's your responsibility as an authority. If you want that. You have to organize; you have to pay a subsidy for it. And if you are just thinking, okay, we are just only subsidizing these lines and the rest is for the markets, I think, then you have no influence anymore on what the market is doing, because you want a network. You that people can make a transfer, that they are connected. Even a subsidized line, is connected to the more and higher cost of covered line. So, it must be a network. You have to think about a network and not just about lines, because of people. So that's why we are doing it this way. And yeah, that's why I think we in the future, we are still subsidizing this because of what we want to reach.

HT: Do you think the subsidies will be increased in the future? Also, maybe to achieve certain goals.

IdB: The next periods definitely, because the consequences of COVID are still there. And I think its, from what I've heard from all the EMTA authorities. I speak with them every two... twice a year. Next week I'm going to OSLO with Alexandre. And what we see as... everywhere in Europe, the revenues are lower than before COVID. But we want to maintain the high quality network we had before, because we expect that there is still passenger growth. And so, I think the next few years, yeah, we still have to subsidize, subsidize more our contracts. Even our

fixed subsidy will increase a bit. And you as an authority, you are responsible for the public transport in the end. So, we have to change a bit, because of the consequence, of COVID. But I don't know of how we do in the future. I don't know. I think if you want more and more and more and more and have no revenues, yeah, we have to do something.

HT: Are you happy with your ratio between subsidies and passenger revenues? Like in general, of course you have now a different approach, but do you think, in comparison to other systems and that's also a good question. Is your authority or is... okay is always very individualistic, but are you having a role model, like okay, they have this cost coverage in this area, maybe we should achieve this, or they are doing it this way. We want to get closer to this system. Do we have something like this?

IdB: Oh, no. I think when we reach a point that we can. Make the network more efficient. The last 10-15 years, we did a lot to make the network more efficient. The walking distance to the bus stops were a bit longer than before. So, you can reduce the bus stop, so you can make the line faster, so you can increase the frequency. Even if you have 4 minutes less travel time, you can make the same amount of busses. You can reach a higher frequency because 4 minutes in a whole hour with six busses before six busses with 4 minutes faster, you can increase your frequency to eight. And with eight busses it's more effective for people. We reached that. But we cannot go further because you cannot, then you are going to lower your bus stops, the people are just saying that's too far away, I'm not using public transport anymore. So, I think we have reached the moment. We cannot make it more efficient. So, if we want more, yeah, we have to improve our subsidy. We have to look what can we do, and we also have to look because the last two years I think it's everywhere the same in the whole Europe is the... The Fares are increasing because of the inflation, because of the higher fuel costs, because of the higher cost everywhere. Last year it was, we had a fare increase of 7%, that's high. Next year they'll be 11. That is, wow. Yeah, in two years, almost 18% of fare increasing. Well, the national government is decreasing the tax of fuel for cars. That's ridiculous. And then they are doing it in Germany much better. But, um, that is something I just think, okay, we as an authority, because we don't have more money, we cannot do, we cannot say we are... we are not increasing the fares because. The costs of the operators they are increasing too. So, if we are not increasing the fares we have, in ten years it costs us 100 million euro. We're doing it next year. Not increasing the fares. We, have losses of almost 200 million euro in about ten years. So, we have to look at what can we do, what can we? So yeah, we are now at the moment, we have to look, what are we going to do, how are we going to our financial situation of our contracts? We have to look at that.

HT: Yeah. Yeah. Perfect. Mm hmm. I see. Of course, these are also the future challenges. Okay. I see. The time is almost over. You have to hop to your next interview. I think we covered a lot of stuff. Thank you so much.

APPENDIX F: TRANSCRIPTS IN ORIGINAL LANGUAGE INCLUDING ENGLISH TRANSLATION

In this appendix, the two interviews hold in German with Thomas Kellenberger from the ZVV in Zurich and Lluís Alegre Valls from ATM in Barcelona, hold in Spanish, will be found here in their original Language, the translation can be found in appendix E. As mentioned in section 6.4. The translation process was carefully conducted with the assistance of Open AI Chat GPT, which was supervised and monitored by the author to ensure accuracy, faithfulness, and correctness of the translated responses to the original ones provided by the participants.

Interview information

Date and Time: 20.04.2023 – 2:00pm

Location: Online – Google meet

Interviewee: Thomas Kellenberger

Organization: ZVV – Züricher Verkehrsverbund

Position: Head of Corporate Communications and Deputy Director

Initials of names

HT: Hannes Terzer, the Author of this paper as well as conductor of this interview

TK: Thomas Kellenberger

Interview transcript

H: Das würde so gehen, passt wunderbar. Auch vorab ist es okay für Sie, wenn ich Ihren Namen sowie auch den ZVV anführe und öffentlich dann mache in der Masterarbeit ist das...

TK: Ja, das ist in Ordnung.

HT: Super, super, super, super, gut. Äh, ja. Starten wir gleich mal direkt. Ja, führen wir das Interview auf Deutsch. Ich habe Ihnen zwar die Fragen auf Englisch geschickt, aber gut.

TK: Es ist einfacher. Wird schon auch gern auf Englisch, aber ist mir lieber auf Deutsch. Beschreiben Sie kurz Ihre berufliche Position innerhalb der ZVV.

TK: Ich bin Leiter Unternehmenskommunikation und stellvertretender Direktor Züricher Verkehrsverbund ZVV.

HT: Okay. Sind Sie schon lange dabei?

TK: Seit 14 Jahren. In verschiedenen Positionen.

HT: Ja, war super. Okay, dann ja. Wissen Sie über einiges Bescheid.

TK: Ja ich sollte es.

HT: Ja. Was würden Sie sagen, sind im Allgemeinen die Hauptmerkmale, die einen gut funktionierenden und attraktiven öffentlichen Nahverkehrsdienst definieren.

TK: Wir sagen das immer. Es ist eigentlich Angebot, Angebot, Angebot. Wir glauben, der Erfolg des öffentlichen Verkehrs, den wir hier in Zürich haben, ist hauptsächlich getrieben durch das gute, dichte Angebot, das in den letzten 30 Jahren aufgebaut wurde. Regelmäßigkeit des Taktes, leichte Merkbarkeit, dann natürlich, aber auch einfacher Tarif dazu. Das sind dann diese engeren Maße Faktoren, die dazu beitragen. Der Preis sicherlich auch, aber nicht so im Vergleich zu der jüngsten Diskussion, wenn wir sicher sagen im Vergleich zum Angebot nicht so relevant wie der Preis ist. Der Preis ist weniger relevant als das Angebot. Dazu natürlich auch gute Infrastruktur, Investitionen in die Infrastruktur, vorausschauend. Das ist sicherlich die Notwendigkeit. Und dann eine gute Abstimmung untereinander, dass das Angebot aufeinander abgestimmt ist.

HT: Super! Ja, ja, die Liniendichte ist ja eigentlich ziemlich hoch, auch im Vergleich. Ja, Ähm. Was wäre für Sie persönlich, aber auch für Ihre Behörde, also fürs ZVV, ein Vorbild für ein öffentliches Nahverkehrsmodell innerhalb der EU und auch der Schweiz?

TK: Das ist eine schwierige Frage. Ich glaube, es gibt einzelne Faktoren in verschiedenen Städten, Großstädten oder auch Metropole von denen wir alle lernen können. Wir haben ein sehr gutes System hier in Zürich. Wir können aber durchaus punktuell, natürlich in Sachen Effizienz oder Absprache oder auch schauen wir auch über die über die Landesgrenzen hinaus und und sagen ja, lassen uns inspirieren oder machen auch Reise. Von daher, Ich glaube nicht, dass das es ein gutes Beispiel gibt. Das ist wahrscheinlich eine Kombination aus verschiedenen Strukturen mit Einbezug der Bevölkerung. All diese Sachen, die Verankerung des öffentlichen Verkehrs dann auch verbessern.

HT: Also ich glaube, ich könnte mir vorstellen, sich auf viele andere Metropolregionen, vielleicht zu Zürich als Vorbild, aber die ZVV hat nicht ein spezielles super Vorbild z.B. die in Madrid machen sind mega oder so was?

TK: Wir haben viele Ebenen wie wir schauen nach Deutschland vor und auch Österreich, wo wir auch ähnliche Strukturen natürlich haben, auch den Gegebenheiten politisch her. In München, Berlin, Hamburg, Wien, da schaut wir auch auf engen Austausch. Da profitiert man natürlich schon auch. Aber wir haben sehr eigene Gegebenheiten hier in unserem System, da kommen vielleicht später noch drauf mit dem Föderalismus. Das ist dann nicht immer auch anwendbar in gleicher Art, aber wir versuchen das. Wir versuchen zu schauen. London natürlich von der Effizienz, von der Kapazität, sehr beeindruckend. Neue Infrastrukturprojekte, da schauen wir manchmal neidisch hin, was da gemacht werden kann. Bei uns ist das ein bisschen

schwieriger. Aber ja, ich glaube nicht, dass es ein einziges oder sagen wir, das ist jetzt das Nonplusultra.

HT: Ja, macht Sinn, macht Sinn. Okay, super. So, wie messen Sie den Erfolg und die Auswirkungen des öffentlichen Nahverkehrs Dienstes? Und welche Kennzahlen verwenden Sie? Betriebsinternen vielleicht auch, falls man das wissen darf..

TK: Ja, wir als Verbund messen eigentlich wenige Kenngrößen. Diese Leistung erbringen ja unsere Verkehrsunternehmen. Wir haben die die Gesamtanzahl der Passagiere, der Einsteiger, die wir pro Jahr natürlich monitoren und auch die Entwicklung begutachten. Wir haben auch die Kosten Unterdeckung, das ist ein wichtiger Faktor, weil wir öffentlich finanziert sind, teilweise. Das muss man auch in den Blick haben. Und wir schauen auch den Modal Split an, wie sich der öffentliche Verkehr im Vergleich zu den anderen Verkehrsmitteln entwickelt hat.

HT: Also, eigentlich ein Großteil der Zahlen, die es ja auch immer in den Jahresberichten gibt.

TK: Genau genau.

HT: Wie würden Sie die Leistung Ihres öffentlichen Verkehrssystems im Vergleich zu anderen Verkehrssystem in der EU und auch der Schweiz betrachten? Und wie und wo würden Sie es positionieren?

TK: Ich glaube, in Sachen Kostendeckungsgrad sind wir relativ hoch. Was ich weiß...

HT: Also mit Kostendeckung, meinen Sie immer den Anteil an Tariffeinnahmen?

TK: Genau, im Vergleich zu den Gesamtkosten. Und was ist der Anteil, der dann durch öffentliche Gelder gedeckt werden muss, der ist bei uns mit über 60 % relativ hoch. Da gibt es in Deutschland oder auch in Österreich andere Verbünde, die tiefer sind. Da haben wir wahrscheinlich eine eher höhere Quote, was, aber auch wichtig ist in unserem System vor allem wegen der politischen Akzeptanz. Wir leben in einer direkten Demokratie, wir haben sehr viel mehr Abstimmungen über ÖPVN Projekte. Da muss man auch ein bisschen mehr das Gefühl haben, was mags grad noch leiden. Man darf nicht allzu viel kosten, weil sonst kippt dann auch die Stimmung in der Bevölkerung. Also man hat diese Wirtschaftlichkeit, die sicher bei uns sehr großgeschrieben ist. Bei Modal Split glaube ich, sind wir auch relativ hoch. Als Kanton, als gesamter ländlicher Kanton mit der Stadt Zürich als das Zentrum. In der Stadt Zürich haben sehr hohe Modal Split Werte von über 60%. Beim Pendlerverkehr sowieso, aber auch im ganzen Gebiet mit 32 % der Wege, die mit dem ÖPNV gemacht werden. Das ist relativ hoch. Ich glaube, da werden wir uns relativ hoch einschätzen.

HT: Ja, dann starten wir direkt mit den nächsten Fragen: Was sind die größten Herausforderungen, Mit denen Sie bei der Verwaltung und Koordination des öffentlichen Nahverkehrs in ihrem Gebiet konfrontiert sind.

TK: Ziele... Einerseits sicher auch die Finanzen, Also wir sind auch Besteller. Wir finanzieren die ganzen, das ganze Verkehrs Angebot und die Infrastruktur auch mit dem Boden zusammen. Es wird alles immer teurer. Planungen von neuer Infrastruktur wird immer anspruchsvoller. Mit Raumplanung, mit Umweltschutz, mit... Also der öffentliche Verkehr kommt immer mehr auch

unter Druck, weil der Platz halt in den Städten begrenzt ist. Da hat es andere Verkehrsträger, die auch Platz brauchen wollen. Und da muss man immer das Gute nebeneinander muss man auch ein bisschen finden. Das ist bei uns im Moment ein Prozess, der gerade Gang ist und auch sehr anspruchsvoll ist, dass man da die richtigen Entscheidungen trifft, auch planerisch, klimapolitisch, verkehrspolitisch auf den ÖV setzt. Kapazitäten sicher auch ein großes Problem ist, in dieser Form bereitstellen zu können, rechtzeitig zu planen. Unsere Bevölkerung wächst und unsere Nachfrage wächst. Unser System und speziell die S Bahn kann nicht so schnell wachsen. Da brauchen wir Ausbauten. Das dauert 10, 15 Jahre, bis sie gebaut sind. Da kommen wir schon auch immer an Grenzen. Das sind so Schwierigkeiten, die wir versuchen proaktiv anzugehen, damit sie nicht explodieren.

HT: Na super... Ähm... Denken Sie, dass die Organisationsstruktur für den öffentlichen Verkehrs Inszenierung Gebiet verbessert werden könnte? Ja. Nein. Warum? Wie würde sich das auf die Qualität und auf die Kosten auswirken?

TK: Als Verbund sind wir ein Teil des Kantons? Wir sind ein Unternehmen des Kantons und der Verwaltung. Was sehr gut ist, ist die Einbettung in diese kantonale Verwaltung mit der Politik, die Nähe zur Politik. Das hilft uns extrem. Verbessert werden können sicher die Prozesse zum Nationalen. Es gibt noch die nationale Sicht natürlich in der Schweiz, Der ÖPNV hört nicht an den Grenzen des Kantons Zürich auf, die Vernetzung. Da gibt es Bestrebungen, das Ganze national noch mehr zu fördern, besser zu vernetzen und zu verengen. Das braucht noch ein Weilchen, da kann man sicher noch ein bisschen verbessern und da müssen wir auch mitarbeiten. Da gibt es Governance, Fragen, Finanzierungsfragen, Geldverteilungs-, Erlösteilungsschlüssel, etc. Da muss man schauen, wie das geht. Neue Tarifsysteme, nationale Tarif Systeme. Da kann man wahrscheinlich schon noch verbessern.

HT: Aber prinzipiell mit dem ZVV, als Verkehrsverbund, dass...

TK: Wir denken, dass wenn man die Geschichte jetzt anschaut, der Erfolg gibt, gibt der Organisation Recht. Wir haben auch Glück, wahrscheinlich mit dem Markt, den wir haben, mit der Stadt Zürich als Zentrum geografisch, gut gelegen und wir konnten davon profitieren. Aber ich glaube, wir waren auch dadurch, dass wir die Infrastruktur selber auch finanzieren können, den Fonds haben, dass wir den Verkehrsraum für Infrastruktur, ausbauen und den Betrieb auch planen. Ist der ÖV aus einer Hand planbar und ja und das kann so geshaped werden. Und das ist, glaube ich, ein sehr effizienter Weg, um den ÖV auch zu pushen. Wir haben große politische Rückhalt seit immer. Das sind sicher sehr gute Faktoren. Die, die uns begünstigt haben in den letzten 30 Jahren.

HT: Super, ja...

TK: Da würde ich nicht viel dran ändern, wenns nicht sein muss.

HT: Ja, ja, ja, ich glaube sowieso, also wenn es dann eine Nahverkehr Autorität gibt, das ist das Optimum, was ich schon gesagt habe, verbunden auch mit dem politischen und dass dann auch das Maximum an Koordinierung, Koordination und Management, hergibt.

TK: Genau.

HT: Glauben Sie, dass die Anzahl der Betreiber Auswirkungen auf den Service hat. In Bezug auf die Servicequalität, die Kosten und anderen Wohlfahrts Maße und mit Betreibern, da ja die Verkehrsbetriebe, die für Sie arbeiten...

TK: Ich glaube nicht, dass die Anzahl einen Einfluss hat, dass das sind ja auch gewachsene Systeme, dass den Verkehrsunternehmen, die gab's, bevor es den Verbund gab. Das ist natürlich gewachsen, da kann man vielleicht ein bisschen optimieren, aber grundsätzlich funktioniert das bei uns relativ gut mit den bestehenden Unternehmen, die wir da hatten. Die Zusammenarbeit mit der S Bahn, das Rückgrat und in den Städten die städtischen Verkehrsunternehmen das ist sehr sinnvoll, so aufgeteilt. Wir haben auch Markt Gebiet definiert, wo die einzelnen Verkehrsunternehmen zuständig sind. Wir denken, eine gewisse Vielfalt ist notwendig, das gibt auch einen gewissen Wettbewerb, einen Ideenwettbewerb, gibt Ansporn. Man kann ein bisschen ja, man wird nicht so träge. Allzu viel wird dann schwieriger zu managen. Wahrscheinlich. Also man muss wahrscheinlich so die Mitte finden, zwischen zu wenig, wo man dann ins Monopol Fleck mal reinfällt und zu viel, die dann einfach willkürlich und schwer zu managen werden.

HT: Bei ihnen ist es ja aufgeteilt auf die... Also es gibt acht oder neun...

TK: Marktverantwortlicher Verkehrsunternehmen Genau.

HT: Okay.

TK: Die haben eine Gebietsschutz Verantwortung. In den betreiben sie auch, die die Fahrplan Gestaltung. Sie haben den Kontakt zu dem Kontakt zu den Kommunen, Sie leisten, Sie sind Konzession Inhaber in diesem Gebiet. Und wir haben dann mit ihnen Kontakt in diesen Angelegenheiten, wenn es um die Finanzierung, Fahrplan, Tarife geht, und Sie haben weiter, unter sich, haben Sie noch Transport Beauftragte. Wenn Sie die Leistung nicht selber erbringen möchten, können Sie Leistungen auch ausschreiben oder wie auch immer. Da gibt es insgesamt 37 Transportunternehmen.

HT: Aha, also dann wird es praktisch. Die ZVV übergibt dann nochmal bestimmte Aufgaben, denn...aha, okay.

TK: Also es ist eigentlich umgekehrt, weil wir ja später gekommen sind. Die hatten vorher ihre Aufgaben aus der Konzession. Sie haben gewisse Aufgaben an uns, wurden gesetzlich delegiert. Wir übernehmen Tarif Planungen und sie übernehmen einen anderen Teil. Und die Fahrleistung kann an andere Transport Beauftragte noch weitergegeben werden.

HT: Dann haben Sie eigentlich gar keinen Einfluss auf die eigentliche Vergabe der Transportleistung, auf die Ausschreibung oder Direktvergabe, je nachdem.

TK: Doch wir müssen da zustimmen. Bei uns ist aber Ausschreibung nicht die nicht die Regel. Okay, wir arbeiten mit einem anderen System, dass Ich, weiß nicht, ob Sie unseren Strategie Bericht auch gelesen haben. Das ist da unter Marktordnung drinnen. Nein, wir setzen da eher auf eine kontinuierliche Zusammenarbeit mit unseren Verkehrsunternehmen und schließen für die Kosteneffizienz eher Zielvereinbarungen etc. ab. Und Ausschreibungen sind nur die Ultima Ratio, das letzte Mittel, auch wenn finanzielle und qualitative Ziele nicht erreicht werden können.

HT: Also alles auch schon wirklich geschichtlich so gewachsen.

TK: Ja genau, genau.

HT: Glauben Sie eigentlich so jetzt noch oder bleiben, es könnten vielleicht Kosten eingespart werden, wenn man das jetzt noch extremer ausschreiben würde.

TK: Wir denken nicht. Wir denken vielleicht, kosten schon, wie die Qualität, Man muss ja immer das Kosten Qualitätskreuz anschauen... Wir denken, dass in einer langjährigen Zusammenarbeit auch die Zusammenarbeit einfacher ist, man besser auf die Qualität Einfluss nehmen kann als bei wechselnden Anbietern, die dann auch wieder anders als wir... Wir denken, wir erreichen unsere finanziellen und qualitativen Ziele auf diesem Weg besser. Und das ist auch politisch bei uns immer so abgesegnet, eigentlich das Verfahren wird so eigentlich alle zwei Jahre bestätigt, auch von unserem Kantonsparlament, dass man da nicht in den vollen Wettbewerb steigen möchte, weil wir nicht denken, dass da so wahnsinnig viel rauszuholen ist.

HT: Sehr interessanter Punkt. So, dann die nächste Frage: Was wäre Ihr Ansatz bei der Ausschreibung der Dienste am Betreiber? Das haben wir genau gerade gequatscht.

TK: Genau, das haben wir abgehakt... Also es gab schon Ausschreibungen von einzelnen Transport beauftragten von einzelnen Leistungen, aber sehr selten. Das macht dann die Verkehrsunternehmen. Die haben dann das Ausschreiben einzelner Linien. Aber wir haben in der Schweiz auch keinen Zwang zur Ausschreibung. Im Schienenverkehr sowieso nicht und beim restlichen öffentlichen Verkehr kann man, muss aber nicht.

HT: Wie könnte die Kosteneffizienz verbessert werden? Gibt es Möglichkeiten, Kosten zu sparen oder neue Einnahmequellen zu generieren?

TK: Ja, das ist eben, wie gesagt, Finanzen. Wir sind als kantonale Stelle sehr daran interessiert, dass das Defizit für Kantone und Gemeinden relativ gering bleibt oder angemessen läuft. Wir üben einen gewissen finanziellen Druck auf die Verkehrsunternehmen aus. Das ist unsere Aufgabe. Wir müssen schauen, dass Effizienzsteigerungen erreicht werden. Wir denken, dass das... wir messen die Qualität und wenn sie außerhalb eines definierten Rahmens sind, dann müssen die Kosten gesenkt werden. Das schaffen wir mit Zielvereinbarungen oder verbindlich vereinbarte, wie auch wie stark die Kosten in den nächsten sechs Jahren bei der Unternehmung gesenkt werden müssen. Und damit haben wir gute Erfahrungen gemacht, weil wir dann nicht... und dahinter ist dann erst die Keule der Ausschreibung, also die Drohung der Ausschreibung. Es motiviert auch die Verkehrsunternehmen, mehr Ziele zu erreichen, die wie auch die auch ambitioniert, aber wenigstens erreichbar sind. Ja, ich glaube, das ist ein besseres Zusammenarbeiten im Sinne der Sache.

HT: Ist es auch schon mal in der Vergangenheit dazu gekommen, dass dann mal ein Betreiber von ihnen das sehr ausgereizt hat und sie dann auch sehr nahe waren bei der Drohung Ausschreibung oder Auswechslung?

TK: Nein, das kam und das kam nicht vor und das war, wir... im Moment denken wir, die Kosten sind... Sie sehen auch diese Abbildung, die wir haben. Die meisten sind innerhalb dieses Rahmens die, die außerhalb sind. Mit denen schauen wir die Sachen an wie kann die Kosten

reduziert werden? Das wird auch ständig, natürlich auch angepasst, ein bisschen verschärft an die, an die Qualität. Man soll sich auch verbessern. Also da glaubt man, man geht zusammen in die richtige Richtung. Bis jetzt musste man das noch nicht ausschreiben.

HT: Wie stellen Sie sicher das Ihr öffentlicher Verkehrs dienst für Benutzer attraktiv ist? Wie haben Sie die Preispolitik bestimmt? Und gibt es besondere Tarif Systeme?

TK: Vielleicht hinten angefangen, wir haben einen bekannten Verbund Tarif, der in Zonen aufgeteilt ist. Das kennt man aus anderen Städten, logischerweise. Das wurde vor 33 Jahren eingeführt. Das ist gerade in Agglomerationen aus unserer Sicht ein sehr großer Vorteil, weil mit einzelnen Strecken, da sind die Strecken sehr unterschiedlich bepreist. Das kann auch Verkehrs leitende Wirkungen dann haben, die unerwünscht sind. Wir haben so viele Querverbindungen parallel Verbindungen. Also wir denken, dass der Zonen Tarif in dicht besiedelten Gebieten eigentlich unschlagbar ist. Wir haben kein spezielles System. Ansonsten wir sind da relativ konservativ unterwegs. Wir kennen die normalen Tages und Einzelfahrkarten und Abonnements. Bei uns gibt es ja noch die nationalen Abonnements, das General Abonnement, das Halbtags... die überlagert sind. Man kann mit dem G in der ganzen Schweiz fahren, das ist auch bei uns anerkannt. Halbtags gibts Rabatt auf alle Preise, auch in der Schweiz, auch bei uns. Also da gibt es so verschiedene Ebenen von Tarifstufen. Wir denken, damit ist das Preisniveau sehr attraktiv für die angebotene Leistung. Es ist im Vergleich zum Ausland vielleicht ein bisschen höher. Wir haben auch höhere Lebenskosten, höhere Löhne. Das kommt alles dazu. Aber es ist es ist auch ein Grundsatz, der bei uns in der Verfassung geschrieben ist, dass der Bahn Nutzer Der ÖV-Nutzer soll sich angemessen an den Kosten des öffentlichen Verkehrs beteiligen. Das heißt, und wir haben einen wirtschaftlichen Auftrag in unserem Gesetz. Von daher, man muss da so ein bisschen die Balance finden, was ist sinnvoll, wie viel kann man abschöpfen in Anführungszeichen und wie viel braucht man Aber auch, um die verkehrspolitischen und klimapolitischen Ziele zu erreichen, die man sich auch gesetzt und man will ja einen höheren Modal Split erreichen. Von daher, wir versuchen da die Balance zu finden, dass die öffentliche Hand nicht zu sehr belastet wird und gleichzeitig aber die Kundinnen und Kunden auch einfach und schnell. Daher sind auch Vertriebs Formen einfacher Vertriebspartner in der ÖV einsteigen zu können.

HT: Ich habe jetzt probiert, vorher Ticket zu kaufen... also wie Sie schon gesagt haben sehr klassische Tickets, also Stunden Ticket, 24 Stunden Ticket und dann eben die Abonnements der Monat und Jahres Abonnement. Sie haben jetzt gesagt, preislich ist es höher. Das war für eine einzelne Fahrt in der selben Tarif Zone 3,10 Schweizer Franken Sind es drei Franken.

TK: Drei Franken Zehn? Ja genau, Ja, das stimmt. Muss kurz die Kosten gucken. Das habe ich jetzt nicht aus...

HT: Nein, Entschuldigung, das war jetzt improvisiert...

TK: Das ist für die Stadt Zone Zehn... Ja, genau. Also, nein, das ist eine doppelte Zone so, oder? Die kostet eben ein bisschen mehr. Genau einen Moment... Tickets... 1 bis 2 Zonen, für ein einzelticket sind 4 Franken 40. Wenn man kein Halbtags hat und wenn man ein Halbtags hat, was in der Schweiz. Und es gab 3 Millionen solcher Abonnements verkauft. Die Hälfte der Bevölkerung hat so einer halbtags, der die bezahlt drei und zehn, das ist richtig. Aber Normalpreis ist vier Franken 40.

HT: Okay, okay. Ähm, ja ganz interessant. Ist 9:00 Uhr Ticket, dass Sie haben? Ja, speziell auch um dann die, die die Spitzen ein bissl abzu... also die Nachfrage bisschen zu verteilen

TK: Genau das haben wir schon seit 20 Jahren eingeführt. Das war wirklich, um die Spitzen zu brechen. Das ist eine der größten Herausforderungen. Natürlich die, die die morgens, abend spitzen, haben sich ein bisschen verändert, mit Homeoffice, leicht geglättet. Aber wir haben eigentlich gemerkt, das ist genau das, wo wir gelernt haben. Die Leute lassen sich durch den Preis nur bedingt leiten... Das Ticket, es war mehr als 50 % günstiger. Aber es hat eigentlich nur eine sehr geringe Verschiebung zu diesem 9:00 Pass stattgefunden, weil die Leute halt, wenn man vor 9:00 arbeiten muss, braucht man ein anderes Ticket. Also man ist als Schüler, für Schüler passt das nicht etc. Also von daher, dass man kann keine so große Verhaltensänderung herbeiführen, mit einem doch sehr großen Rabatt, den wir gewährt haben. Das war so ein bisschen das Learning aus diesem Tarif genutzt wird weiterhin für Wochenenden für den Freizeit Verkehr ist ein sehr attraktives Ticket, aber die gewünschte Verlagerung für die für die Spitzen oder die Glättung der Spitzen, die haben nicht stattgefunden.

HT: Was mir auch aufgefallen ist, war, dass übertragbare Ticket...

TK: Das war ein starker Wunsch bei Kundinnen. Das wurde relativ früh eingeführt, auf Kundenwunsch hin und das wird auch jetzt noch relativ von einigen doch nachgefragt, die das einfach auch übertragen wollen.

HT: Und, nur Frage Ich habe immer auch gesehen, es gibt bei den einzelnen Tickets, Monats ticket, überall erste Klasse, zweite Klasse. Ist Dass dann aber nur für die bestimmten regionalen oder...

TK: Das gilt im ganzen Gebiet, also wo es halt erste Klasse hat. Busse haben logischerweise keine, aber man kann dann auch bei uns kann man auch im Fernverkehr ist einsteigen mit einem Verbund Tickets...

HT: Achso...

TK: Ja, also die Tickets sind auf allen Verkehrsmitteln, auch am Schiff, man kann auch erste Klasse am Schiff fahren mit diesen mit diesem Ticket. Ja, daran halten wir noch fest, das ist ein Markt, Gerade in der Schweiz, wo der ÖV immer ein sehr gutes Standing hat. Ist es eigentlich auch... Die Leute schätzen das auch und wünschen das auch, dass man auch gewisses Angebot für erste Klasse für Arbeitende, damit man gut arbeiten kann im Pendlerverkehr. Ja, das wird stark nachgefragt.

HT: Wow, okay, okay.

TK: Was ich noch Vergessen hab, weiß nicht, ob Sie das gesehen haben, das Check-in Ticket. Ist es kein Ticket, sondern es eine Vertriebs Lösung haben, um die Einfachheit... Da Sie gesagt haben Sie versucht ein Ticket zu kaufen, das gibt es ja... Ich weiß nicht, ob Sie das Wen das bekannt ist... Es ist schweizweit, kann man mit der App, Einsteigen, Check-in machen und aussteigen. Es wird korrekt abgerechnet. Am Abend gilt in der ganzen Schweiz. Es wird dann der richtige Verbund oder auch nationale Strecken Ticket. Das wird automatisch abgerechnet. Was von daher, dass senkt die Stufe für die Benutzung des ÖV's. Man braucht nicht im Vorfeld ein

Ticket zu kaufen, sondern man steigt einfach rein, hinterlegt ein Zahlungsmittel, kann sogar auch auf Rechnung machen und schiebt den Riegel rüber und wieder steigt aus, checkt aus und kriegt nach einer Abrechnung für die richtige für den definitiv besten Preis.

HT: Das habe ich jetzt auch... Ich war vor kurzem in Amsterdam, da habe ich das auch das erste Mal gesehen... Das war auch super. Echt sehr...

TK: Bei uns ist das noch ein bisschen weiter gediehen, weil wir sind das ganze Land mit allen 250 Verkehrsunternehmen, die sind alle angeschlossen, Alle Tarife sind inklusive sie können auf dem Berg XY fahren, alle Bergbahnen, alles ist inklusive. Da wird alles nachher im Nachhinein abgerechnet, auch mit Caps, eine Tageskarte oder was auch immer. Man kriegt dann die Besten, den besten Preis, der verfügbar ist, den kriegt.

HT: Super, Hört sich gut an, ja.

TK: Wir schweifen ab, Entschuldigung...

HT: Ich finde das super interessant. Das ist nützlich. Ja, das sieht man nicht so oft. Normalerweise könnte ich mir vorstellen, man zahlt mit Karte und dann kriegt man eine extra irgendeine Gebühr drauf, weil man dann eine Karte gezahlt hat. Das wäre so in anderen Ländern vielleicht gang und gäbe... Kurz noch zur Preispolitik. Also wie Sie das bestimmen, wie die geht. Der Prozess, wie der ZVV die Preise festlegt.

TK: Wir müssen eine Finanzplanung machen. Natürlich, weil wir das Defizit vom Kanton refinanziert erhalten müssen. Das heißt, wir. Wir müssen darin ungefähr schauen, wie viele Einnahmen planen wir für die nächsten Jahre, wie viele Ausgaben haben wir und das Delta, Was müssen wir dann holen. Und da muss man schauen, wie das irgendwann mal zu hoch wird. Dann muss man vielleicht eine Tarif Maßnahme ins Auge fassen. Das ist jetzt passiert. Wir haben in diesem Jahr zum Ersten Mal seit sieben Jahren die Tarife, also planen wir wieder anzupassen. Das war vorher, jetzt sieben Jahre lang so und verändert. Jetzt, mit der Teuerung, die gekommen ist, haben wir höhere Kosten. Die müssen wir ein bisschen abfedern. Das geht dann bei uns, das können wir nicht selber bestimmen. Weil die Kantone und Gemeinden das Finanzieren, gibt es bei uns eine Vernehmlassung zuerst bei allen Gemeinden. Die können Stellung nehmen dazu und ob sie das gut finden oder nicht. Da entscheidet der Verkehrsraum von uns und da muss die Regierung muss den Tarif auch noch genehmigen.

HT: Okay, also durch viele Instanzen geht es praktisch.

TK: Genau, auch der preisüberwacher, die können sich alle dazu äußern. Und dann am Ende ist das ein politisch auch legitimer, weil er von der Regierung genehmigt wurde. Tarif, der dann so veröffentlicht wird.

HT: Ja okay.

TK: Sehr schweizerisch, direktdemokratisch.

HT: Wenn es die ganzen Instanzen jetzt nicht geben würde, denken Sie also, sie haben sicher auch Studie gemacht, Man könnte den Preis noch höher fahren, bei gleichbleibender Nachfrage dann, oder...

TK: Nein, also da gibt es eine Elastizität, logischerweise. Man stößt irgendwann mal eine an der Grenze, wo man mit einer Erhöhung dann nicht mehr Mehreinnahmen erzielt. Und das muss man verhindern. Das hat man bei uns In den 90er Jahren ist das einmal passiert, da hat man glaube ich, um 6 % oder sechs 7 % die Tarife erhöht und hat dann im nächsten Jahr eigentlich weniger in der Kasse gehabt als im Jahr davor. Und das war für uns auch so ein Warning. Man darf das nicht überstrapazieren, sondern man muss wirklich gucken, was ist am Markt erhältlich. Wir möchten, also es geht ja nicht um die Abschöpfung, sondern es geht einfach darum, die Balance so einigermaßen zu halten. Was kann man in der Politik verantworten? Mit welchen Defiziten kann man kommen, bevor die Politik dann sagt, Ja, jetzt müsst ihr aber auch mal sparen und dann muss man ja beim Angebot sparen... Das möchten wir versuchen, das Angebot so gut wie möglich auszubauen, immer stetig auszubauen und die Preise zu halten und wenn, dann maßvoll auch zu erhöhen.

HT: Ja, ja, okay. Das Ziel ist ja vor allem, das Angebot auszubauen.

TK: Genau. Ja und ein Angebot abbauen. Das kann dann irgendwann mal kommen. Wenn dann das Defizit zu hoch wird, dann sagt die Regierung oder das Parlament irgendwann mal Das Budget haben wir jetzt nicht, da wird irgendwo aber gestrichen und das nicht mehr. Natürlich muss vermieden werden.

HT: Wunderbar. Genau. Auch haben wir teilweise schon angeschnitten: Sollte der Finanzierung Anteil von Subventionen oder Fahrgeld Einnahmen geändert werden?

TK: Wir denken wir haben eine gute Balance gefunden, dass der Kostendeckung bei uns liegt bei ungefähr 60 % 65 %, was auch schon bei 70 % kurz nach Covid natürlich tiefer. Aber ich glaube, das ist so politisch angemessen und auch vertretbar.

HT: Okay: Was ist Ihre Meinung zu Subventionen? Wie werden Sie sich in Zukunft entwickeln?

TK: Ja. Wenn wir die Planung, unsere finanzielle Planung anschauen, dann ist es ein Wachstumsmarkt. Wir werden mehr Einnahmen haben, werden aber auch mehr Kosten haben, weil wir mehr Leute haben in unserem Einzugsgebiet. Das heißt, unser Defizit wird wachsen? Ja, lässt sich nur schwer verhindern, eben mit Tarifeinnahmen ein bisschen abfedern. Wir werden sicher mehr Einnahmen haben, aber es lässt sich nicht ganz verhindern, dass die, dass die Ausgaben steigen werden und wir mehr öffentliche Unterstützung brauchen werden. Die Kostendeckung wird ungefähr gleich bleiben. Aber weil das ganze Geschäft natürlich nimmt die absolute Zahl dann irgendwann mal zu mit Teuerung etc. dann versuchen, damit sie schon eine Stabilität reinzukriegen. Wir sehen, das ist auch eine Aufgabe um die Akzeptanz des öffentlichen Verkehrs in der gesamten Bevölkerung, weil ja längst nicht alle den ÖV benutzen. Aber alle bezahlen dafür über Steuern. Da muss man auch ein bisschen das Feingefühl haben. Eben ja, man muss sich schon anstrengen. Also die Wirtschaftlichkeit ist schon ein wichtiger Aspekt auch für uns.

HT: Ansonsten sehen Sie irgendwelche Nachteile oder Probleme im Subvention Prozess.

TK: Im Prozess jetzt oder...

HT: Also, dass es dann zu falschen Anreizen kommen würde oder...

TK: Ich glaube nicht. Das ist in der Schweiz... Wir kriegen ein Ratenkredit für zwei Jahre. Man muss alle zwei Jahre wieder ins Parlament gehen durch die Regierung. Also das ist das ist ja nicht so, dass man einfach einen Blankoscheck kriegt und dann, sondern da muss man eine kleine, klare Rechnung präsentieren und dann auch da wird schon auch geschaut politisch. Da ist von links bis rechts im Spektrum alles vertreten, im Parlament, in den Kommissionen und da wird schon hin geschaut haben, ja, passt das einigermaßen oder laufen da die Kosten aus dem Ruder oder muss man da vielleicht die Schraube anziehen. Wir haben eine ständige politische Kontrolle, die, die eigentlich nicht zulässt, dass da irgendwie etwas aus dem Ruder laufen könnte. Beantwortet, dass die Frage?

HT: Ja, die Frage ist schwieriger hier zu verstehen... Ich glaube, das ist wunderbar. Ja.

TK: Okay, kurz...

HT: Letzte Frage auch schon: Was sind die aktuellen langfristigen Ziele der ZVV und wie sehen Sie die Entwicklung?

TK: Das macht wieder die die Kurve zum Anfang. Sicher, das Angebot soll weiter ausgebaut werden. Wir haben einen großen Angebots Schritt der Mitte des nächsten Jahrzehnts auf der Bahn passiert. Da werden 6 Milliarden Franken in unserem Kanton verbaut für neue Bahninfrastruktur. Das ermöglicht ein Angebots Ausbau von x Prozent wieder mehr Kapazitäten. Das ist absolut notwendig. Wir haben Stadtbahnen, die geplant werden. Das sind große Projekte von mehreren 100 Millionen Franken, die, die aufgelegt und weitergetrieben werden müssen. Also das ist eine große Aufgabe, gleichzeitig die Finanzierung im Auge behalten, dass es nicht aus dem Ruder läuft mit der Teuerung, mit dem Treibstoff und Energiepreisen. Großes Thema ist die Dekarbonisierung, die Elektrifizierung. Das kostet auch wahnsinnig viel Geld, ist aber notwendig. Trotzdem kommt man in alle Abhängigkeit von Energie bei Strom Anlagen, die man dann nicht hat. Ja, die ganzen Depots, die ganzen Anlagen, die es da braucht, die planerischen Konsequenzen, wenn man ausbaut, das ist es wird alles sehr komplex. Eine neue Anlage für die S Bahn, die wir dann brauchen für den Ausbau. Schritt braucht zehn Kilometer Abstellgleise. Das findet sich nicht so schnell in einem dichtbesiedelten Raum. Das will auch niemand gleich vor seiner Tür haben. Das versteht man auch. Da gibt es Schutzgebiete, Natur. Aber man muss ganz viele Interessen berücksichtigen. Ja, das sind so sehr spannende Fragestellungen, die man aber lösen muss, weil man ja das Ziel hat, dass die politischen Ziele Modal Split zu erhöhen auf 40 oder noch mehr Prozent. Da muss man ausbauen oder auch Verlagerung irgendwie hinkriegen. Und dafür braucht es die richtige Infrastruktur und das richtige Angebot.

HT: Ja, ja, natürlich. Mit der Elektrifizierung meinten Sie vor allem auch die ganzen Busse etc.

TK: Na ja. Ja, natürlich. Aber die ganzen Busse, die ganzen Anlagen für Busse, auch die Stromversorgung für Busse, das ja, das muss alles noch geklärt werden. Wo macht man das? Ist das, wie kann man das sinnvoll auch kombinieren? Weil die stehen, ja nur über Nacht hinten und dann steht das sonst leer. Gibt es da irgendwie Nutzungen, die man auch mit der Wirtschaft oder so was? Ansonsten investiert man da sehr viel Geld. Dass das nicht sinnvoll, dass anders sinnvoller genutzt werden könnte, sind da doch öffentliche Gelder. Und da muss man ein bisschen schauen, was sind die besten Projekte und Ideen. Ach ja, und da haben wir schon noch viele Aufgaben, viele Herausforderungen. Aber daran arbeiten wir. Und so etwas zu machen.

HT: Ja wunderbar. Danke schön. Also mein Fragenkatalog ist fertig und wirklich super beantwortet. Einen sehr interessanten Input habe ich bekommen.

Interview information

Date and Time: 24.04.2023 – 11:00 am

Location: Online – Google meet

Interviewee: Lluís Alegre Valls

Organization: ATM – Autoritat del Transport Metropolità

Position: Director of the mobility department

Initials of names

HT: Hannes Terzer, the Author of this paper as well as conductor of this interview

LAV: Lluís Alegre Valls, the interviewed

Interview transcript

HT: Vale, no hay problema. No hay problema. Creo que en 30, 40 minutos ya hemos terminado. Nada. Estoy contento de hacer esta entrevista con usted. Con alguien de la ATM y que usted ha ya recibido las preguntas. Así tiene una idea. Nada en antemano quiero preguntarle algunas cosas para el acuerdo de privacidad. ¿Está de acuerdo que se grabe la entrevista?

LAV: Sí, sí, estoy de acuerdo.

HT: Perfecto, y también que menciona su nombre en mi tesis de maestría.

LAV: Sí, sí.

HT: Perfecto. Perfecto. Tengo que solo escribir el nombre porque hasta ahora no sabía con quién voy a hacerla. Estoy listo. ¿Usted tiene una pregunta para mí antes que empezamos o no?

LAV: Bueno, yo sólo era. Era de preguntarte de la universidad. Cuál era

HT: La Universidad de Viena

LAV: ¿De Viena? Vale.

HT: Y estoy haciendo la tesis de maestría y hago básicamente una investigación sobre varios sistemas de transporte público en ciudades metropolitanas y eso es. Sí, eso decía. La segunda entrevista que hago. La primera fue con uno de la Autoridad de Zúrich en Suiza.

LAV: A ver y tú eres... ¿Tú, qué formación tienes?

HT: ADE

LAV: Ah, vale. Pues vamos al grano, porque yo a las 12 tengo otra y...

HT: Vale, vale. ¿Podría escribir brevemente su posición profesional dentro de la ATM?

LAV: Sí, Si. Yo soy el director del área de movilidad. Soy ingeniero de caminos y. O sea, ingeniero civil. No, ¿qué decís vosotros? Y también estoy diplomado en ADE en Finanzas y estos temas.

HT: Ya hace mucho tiempo que usted trabaja para ATM.

LAV: Sí, desde el 2006.

HT: ¿Cuáles diría que son las características principales que definen un servicio de transporte público, bien funcionante y atractivo en general?

LAV: Las características principales de transporte público, gestiona bien y sea atractivo... Hombre un servicio de transporte público debe llevar a la gente cerca de que donde residen, Trabajando o donde quieran ir. Dos, tiene que tener una frecuencia a de acuerdo con las necesidades de la demanda que tengas en ese punto. Debería ser un transporte lógicamente accesible. Confortable. ¿Eh? Digamos que, que pueda, que tienda todas las necesidades funcionales y de seguridad que. Que la gente...y sí, bueno, evidentemente que funcione bien. Sí. O sea que por tanto, que no tenga demasiadas incidencias...

HT: ¿Cuál sería para usted personalmente, y también para la ATM un modelo a seguir en el transporte público dentro la Unión Europea y también Suiza?

LAV: ¿Un modelo si seguía?

HT: Si, si, Exactamente. La ATM tiene, por ejemplo, no sé el modelo como esta en Madrid, un modelo donde nosotros queremos llegado.

LAV: No, no estamos. Mira, me coge un poco en esta pregunta. Ya la vi. Un poco de... No, no tenemos eso. Nosotros trabajamos con la idea nuestros lo que llamamos un modelo. De red. Es que todas las redes, sean del nivel que sea, se hablen entre ellas y estén conectadas. Es decir, que, desde la alta velocidad a la red de bicicletas, veamos estén pensadas y concebidas de una manera integral y conjunta. Aunque la red de alta velocidad pueda conectar Madrid, Zaragoza y Barcelona o Barcelona con Perpignan. Las paradas que tiene intermedias influyen también. En el modelo de transporte público de la ciudad. Hoy, por ejemplo, no sé si conoces Catalunya, pues de Barcelona hay una ciudad que se llama Girona, que está a unos 90, 80, 90 kilómetros y cada tiene alta velocidad y tiene trenes regionales. Se complementan totalmente y en cambio nadie lo pensó. En cambio, son súper complementarios y además hay un sistema de autobuses... Pues en el saberlos con entonces yo no sé en estos momentos no tengo conciencia de que en otras autoridades es el transporte este es un tema que está resuelto y por tanto este es nuestro modelo. Ahora me puedes decir pues me gusta el ferrocarril suizo. Pues el ferrocarril sí, pero no acabo de saber si está realmente bien construido a nivel ... y en su conexión urbano. No, no tengo suficiente información para poder decir. Me gusta la red holandesa. Pues sí, me gusta la

rotonda holandesa con lo que tiene. Pero tampoco te sabría garantizar a la alemana, pero no te podría garantizar que estén construidas de la manera que nosotros estamos pensando ahora.

HT: Claro... ¿Cómo mide el éxito el impacto de su servicio de transporte público y que métricas utiliza?

LAV: Bueno, el éxito. Nosotros utilizamos a dos. Tenemos el que más importa la opinión de la gente. Cada año hacemos una encuesta sobre todo sistema. Intentamos entender si vamos bien o vamos. Por tanto, lo que la gente piense es muy importante. Está muy bien que tú digas que un sistema es muy bueno. Pero si a la gente le parece que no es que no lo es. Realmente lo puede hacer, ¿no? La segunda manera es indicadores de eficiencia y de eficacia. O sea, de alguna manera ver. Si los recursos que llevo, que pongo llevan a la gente que han de llevar. Es decir. Si pongo un tren en un sitio que puedo llevar gente con un autobús, eso es muy poco eficaz y muy poco eficiente, pues esto lo tengo que meter. Lo mío es en vistas, vista económico y desde el punto de vista de servicio. Es decir, y esto también tengo unos indicadores. Y por último tengo, no sé, económicos, en los cuales intento ver si el coste, que es lo que estoy haciendo, la inversión que estoy utilizando es proporcional al OK, al resultado que obtengo.

HT: ¿Y usted se mide esto con los ingresos de pasajeros o con cantidades de pasajeros?

LAV: Con la demanda, número de los viajeros porque los ingresos. Recuerda que a menos tenemos subvencionado, el sistema y por tanto el ingreso engaña un poco. No miramos, ¿eh? Pero miramos para cuándo? Para saber la cobertura que tenemos y esto. Pero allá mismo en el ingreso de pasajeros igual cubre el 35% del gasto, el otro 65% viene de aportaciones de las varias instituciones.

HT: Sí, sí... No, de eso hablamos luego. ¿Pues cómo considera el rendimiento de su sistema transporte público en comparación con otros sistemas de transporte en la Unión Europea?

LAV: Bueno, nosotros hacemos una, un barómetro del transporte público a nivel europeo, que no sé si lo conocí...

HT: Si la EMTA

LAV: Pues este es el sistema que utilizamos. Entonces cada año lo presentamos en nuestro board y vemos como, va y tal. No es, no, es excesivamente... no es muy bueno como sistema porque tenemos maneras de medir poco diferentes, pero es lo mejor que hemos conseguido.

HT: Claro. Sí, sí, al final está con la comparación es siempre muy difícil como porque como usted ha dicho antes, que es muy de historia y también de cultura, ¿no? Pues vale, vale, Seguimos con las otras preguntas. ¿Cuáles son los mayores retos que enfrenta la ministra y coordina y maneja el transporte público en su zona?

LAV: ¿Los mayores retos? Sí, bueno. Primero, que el transporte público tiene varias administraciones que son titulares. Es decir, es el Estado. El gobierno autonómico. Los gobiernos metropolitanos y los gobiernos locales y cada uno de ellos tiene una lógica diferente. Coordinarlos es extraordinariamente difícil... Difícil... No digo que imposible, pero muy muy difícil. Y esto y en las grandes infraestructuras. Es un tema clave. Barcelona... Barcelona hace un nuevo túnel.

Bueno hace dos nuevos túneles. Uno lo va a hacer el Gobierno del Estado y lo va a hacer la Generalidad de Cataluña. En los dos proyectos no se hablan, nunca se ha.

Por lo tanto, este es un gran problema.

El en otro de los problemas que tiene el transporte público. Este es un problema de coordinación, quizás el mayor. Pero otro problema que tiene el transporte público en estos momentos es dar respuesta a los cambios que se están produciendo en el mundo, es decir, dar respuesta a la necesidad de incrementar la oferta, con un presupuesto limitado, muy limitado, es decir, que necesitamos crecer el transporte público muchísimo para disminuir el vehículo privado y poder dar mucho más espacio al peatón, a la bicicleta, a las personas. Y esto pide unas inversiones que ahora mismo en llevamos unos cuantos años de crisis y no se acaba de ver cuándo existirá ese dinero.

HT: Si, si... Entonces, no, quiero sólo añadir una cosita. Entonces un reto bastante grande es, es la política y la coordinación entre las varias entidades.

LAV: Si, si correcto.

HT: La ATM no tiene la competencia total. En algunos casos, por ejemplo...

LAV: Nosotros planificamos, en planificación si tenemos la competencia. Pero la planificación nunca llega al detalle, de lo que es el proyecto o al detalle, del servicio. al detalle. Y en ese paso al detalle, pues se pierden muchas cosas.

HT: Que la estructura organizativa del servicio del transporte público en su área se podría mejorarse... Vale ya de eso hemos hablado.

LAV: Sí, mi opinión es que hay muchas calles. Vamos a hablar hoy de transporte público en superficie. Y el transporte público ferroviario. El transporte público en superficie debería, estar mucho más coordinado. Ahora mismo funciona a tres niveles local. Local, Metropolitano y interurbano a la que lo llevaba. El gobierno autonómico. Cuesta. Diríamos, la lógica de cada uno de ellos funciona. Perdona un momento...

HT: Si...

LAV: Diríamos, los puntos de intercambio. Pasan a ser elementos muy críticos. Y de nuevo podemos, tenemos una gran dificultad para que esa es yo creo, desde mi punto de vista, esos puntos de intercambio y el tema de las conexiones tendrían que ser responsabilidad segura de la autoridad del transporte. Porque ahora son en general son como responsabilidad del más grande. Es decir, si en ese punto de intercambio hay una parada de metro y una parada de autobús, manda al metro. Y no, tienen que hacerse de igual a igual, aunque uno sea más grande que el otro para que funcionen bien.

HT: Entonces. No estoy seguro si lo he entendido bien. Si hay una parada y dos vehículos, no la meto. Y un bus, comanda la metro.

LAV: La decisión en el intercambiador siempre manda el, el más grande. Pero se olvida de pensar en el en el resto. Entonces yo creo que ese es un tema fundamental. Es decir, los núcleos,

los nodos de intercambio son casi un tema de país, si no un tema de cada red. Y las redes tienen que respetar un poco esos nodos de intercambio. A cada nivel de cada. Los nodos de intercambio tienen diferentes niveles. No, no, no, siempre son de país. Puede ser nivel metropolitano, urbano o incluso nivel, diríamos, de cuando tienes. Pero nosotros llevamos el tranvía. El tranvía es metropolitano, pero conecta con todas las redes urbanas. Los puntos de intercambio de tranvía son fundamentales para que el tranvía funcione bien, pero también porque la red, la red urbana, sea mucho más potente. Esto cuesta también. Este es un tema que debería estar organizativamente mucho más integrado en el ámbito nuestro de la de la planificación, porque nosotros decidimos dónde va, pero lo que pasa allí dentro no, y deberíamos decidir lo que pasa allí dentro.

HT: ¿Entonces usted piensa que el número de todo es tiene un impacto en el servicio?

LAV: Sí, tiene importancia, sí, pero tiene importancia, sobre todo los las, las administraciones titulares, los dos tienen importancia. Es decir, los autobuses de cada ayuntamiento son de cada ayuntamiento. Pero en este caso el problema es más bien organizativo, no es tan político, es más organizativo de las redes. Y en el momento que se piensa en las redes y

HT: Entonces el problema es que la ATM no está tan fuerte o no tiene bastante competencias...

LAV: Sí, exactamente

HT: En General en la ATM, hay muchas empresas que ofrecen o que trabajan, ¿paga el servicio y usted piensa que si hay menos operadoras esto influye a la calidad o los costos u otras medidas de bienestar?

LAV: A ver, no creo que sea un problema del número de operadores, porque diríamos, es decir, lo que marca la calidad de un sistema es el pliego de condiciones del de la administración que elabora. Es decir, si haces un buen pliego de condiciones y lo haces cumplir, ya está. Es evidente que un tamaño mínimo de operador es conveniente por un tema de poder pagar las cocheras. Si siempre, a no ser que las cocheras sean públicas. Pero si las cocheras no son públicas tiene que haber un número mínimo de servicios para que puedan ser rentables. Pero también tengo que decir que las empresas excesivamente grandes llegan a influir. Pueden llegar a influir. En el servicio para que se adapte a sus necesidades y no tanto a las del servicio. O sea que mi opinión es que puede haber diferentes tamaños de empresas. Yo creo, y mi opinión es que los grandes grupos, deberían quedarse en los grandes proyectos, siempre de uno y en y en los medianos proyectos y pequeños deberían poder acceder a empresas más locales o medianas y creo que lo pueden hacer perfectamente bien. Por tanto, no es un tema de número de operadores, sino sobre todo es que el pliego llega, haga la administración, después se pueda hacer cumplir.

HT: Una pregunta sobre eso que ya hemos hablado antes, el problema de puntos de intercambio en Barcelona hay básicamente el TMB, que es responsable de toda la Metro y también los los autobuses. Ahí también pasan estos problemas con con...

LAV: TMB es un gran operador que es el operador de Barcelona. Si su tamaño esta muy vinculado al tamaño de la ciudad. Si, sé que entiendo.

Que por ejemplo pues Tarrasa, que es una ciudad de 200.000 habitantes, pues tiene un operador diferente y solo tiene un operador claro, así que entiendo que el servicio urbano de una ciudad

no lo gane un único operador o sí, La ciudad es enorme, enorme, enorme. Con Nueva York pueda tener dos o tres operadores. Esto sí que lo entiendo, pero nosotros somos metropolitanos. No somos urbanos entonces nosotros ya nos ya estamos acostumbrados a trabajar con 50 o 60 operadores. No, no, no es para nosotros un problema de esto el problema es que el operador que no cumple las condiciones.

HT: ¿Cuál es su enfoque para la utilización de servicios apagados? Cómo mejorar la calidad y los costos.

LAV: ¿De la licitación?

HT: Sería más o menos politización mejor para los encontrarás o tenía una relación más larga con algún operador. Como usted verá eso.

LAV: Yo yo, en cuanto a los operadores, hay dos tipos los ferroviarios y los viarios. Los operadores viarios, yo creo que hay que el tiempo. Más, más o menos lógico. Puede ser a los diez años. Ocho años, 12 años. Depende... Por ahí parece ser un tiempo suficiente para que amortizar sus inversiones y esto, pero. Pero el enfoque del pliego ha de ser. Ha de haber condiciones de, de bonus y de malos. Para decirlo de una manera respecto a cómo actúan en diferentes indicadores de calidad. Y hay que esto es importante. Es decir, no puedes dejar el complejo una vez aprobado y ya está. No tiene que haber un cada año un análisis de cómo ha funcionado y poderlo premiar o castigar año. En función de cómo haya actuado. Incluso aunque el contrato dura diez años tendría que haber un momento en el medio de cinco años que el haber incumplido determinados operadores los pudieses expulsar. Hay determinados indicadores lo pudieses expulsar.

HT: Eso, eso no hay al momento.

LAV: No hay, Si ahora tenemos bonos, sí que tenemos condiciones de de bonos y malos, pero pesan poco. Sí que lo hay. Sí que lo hay. Pero yo creo que se deberían a ser más, más, más duros más exigentes.

Speaker 1: Y también los los operadores se cambian frecuentemente y después el contacto se termina.

LAV: Bueno, hay casos que sí hay casos que no mandan a concurso. Lo que yo creo que se ha de evitar es coger el más barato o que es aquí el tema económico tiene que tener un peso pequeño.

HT: La calidad más, pero a pesar más la calidad de cumplir esa calidad, que el precio.

HT: Interesante. Vale, vale...

LAV: porque esto es, esto va de servicio a la gente...

HT: Sí, Sí. Cómo se podía mejorar la eficiencia de costos en.

LAV: ¿La eficiencia de costos?

HT: Si hay posibilidades de ahorrar costos y crear, por otro lado, ¿nuevos flujos de ingreso?

LAV: A mejorar la eficiencia de costes. Es imprescindible, por ejemplo, en superficie, que los autobuses tengan realmente un espacio dedicado. Carriles bus que llamamos en todas las vías en que hay congestión. Pero con carriles bus bien hechos. Tres metros y medio de ancho. No hay estudios de universidades sudamericanas, que ya hay bastante, sobre todo en la de Chile, que en que demuestran que hay determinadas acciones en la vía pública. Por ejemplo, la localización de las paradas a más o menos distancia del semáforo. Y esto si que ayudan a mejorar la eficiencia y por tanto la de ahorrar dinero. Ese tipo de cosas aquí cuesta mucho de hacer y yo creo que son buenas. Aquí tenemos carriles buses, pero con... estrechos. Las paradas se colocan mucho en función de que no molesten a los vecinos. Y esto condiciona mucho que no funcionen bien, ¿no? Esto es posibilidad de ahorrar costes. Hombre, yo creo que la energía aparece muchas oportunidades. Con la electrificación. con el tiempo. Los autobuses. La mecánica de los autobuses es mucho más económica, tienen menos averías y en principio la energía eléctrica es más barata. Por tanto, aquí aparece una gran oportunidad a medio plazo, porque aún estamos haciendo la transición. En el tema de mano de obra. Pues está más difícil porque el coste más importante son los conductores. Y bueno, ya veremos el vehículo autónomo, que como llegará al sistema ferroviario sin conductor sistema ferroviario es más caro, es el vehículo ferroviario. Yo creo que iremos a metros autónomos y por tanto habrá ahorros en el tener en la mano de obra. Pero tampoco se puede hacer mucho, ¿no? En el sistema de transportes, si tienes un buen sistema de transporte, ya cuesta mucho de bajar. Otra cosa son los ingresos. Los ingresos. hay una parte que vienen de tarifas que nosotros creemos que deberían venir. de tasas de congestión como hay en Londres, por ejemplo, en Milán. Creemos que y también creemos que un buen sistema de transporte de Francia. Creemos que son dos modelos que los hemos estado estudiando. Los políticos no se atreven, pero la una pasa sobre el aparcamiento como hay en Inglaterra también, o una tasa sobre las zonas de bajas emisiones o este tipo de cosas, o el ver sementó exporta de Francia. Creo que son sistemas buenos, pero hay por parte de los políticos miedo a aplicarlos.

HT: Por eso usted piensa que las subvenciones podían aumentarse.

LAV: ¿La subvención?

HT: ¿En general la financiación del servicio del transporte público?

LAV: No, yo creo que el porcentaje que tenemos ahora mismo aquí es un porcentaje. Me parece bastante correcto. Entre otros ingresos y subvenciones.

HT: Otros ingresos, hay otros.

LAV: Y otros, ingresos, subvenciones y lo que sea. O sea, yo creo que los pasajeros o nosotros tenemos. La opinión de que paguen de media un 35% del coste o un 40 nos parece correcto. Más, más, más, el 50% Pensamos que no. Pero es una opinión. Es evidente. Es una opinión. Esto es una opinión. Pensamos que las administraciones deben aportar una parte del coste. Porque es un servicio público y entonces ya otra cosa es cómo, como repartes esas tarifas. Evidentemente creemos que una parte importante de las tarifas deben ser sociales. Por tanto, hay gente que no paga y por tanto creemos que hay gente que paga más del 40%, que paga al 60 para que ese 60 pague lo que no pagan los otros. Y hacer de media ese 30 y pico por ciento.

HT: Y así tenemos que hacen diez, 11, 12 minutos y faltan cuatro preguntas o cinco. Sí, a ver, ya estamos hablando, no, También de las de la política, ¿de los precios y cómo asegura usted que el transporte público sea atractivo para los usuarios y cómo determina los precios? ¿Y qué piensa usted de la oferta de los billetes que hay?

LAV: A ver, nosotros en estos momentos yo quiero decir dos cosas como diferentes. Primero, no genera más idea general. La gente que no puede pagar el transporte público se le debe ayudar a pagar el transporte público.

HT: ¿En eso hay ayudas?

LAV: Aquí sí tenemos lo que tenemos e iríamos para los parados, para la gente mayor, para los menores, los menores de 16 años es gratuito.

HT: Vale, vale, ¿esto son todos tipos de billetes?

LAV: Pero después hay una parte importante de las personas que. Que sí deben pagar algo de ese servicio. Entonces nosotros ahora tenemos en las zonas urbanas. como una tarifa plana. Es igual lo que hagas durante un tiempo, pagas lo mismo y no solo las interurbanas. Tenemos como coronas, yo. A mí me gustaría cambiar hasta la zona, hasta la tarifa plana de las zonas urbanas. Pero no hay nadie. Nadie está de acuerdo conmigo, o sea que no debo tener razón. Si se mantiene la tarifa plana en las zonas urbanas. Vale. Las zonas urbanas. Por tanto, hay tarifa social y tarifa plana de alguna manera. Pero en las zonas interurbanas estamos trabajando para pasar a un sistema kilométrico por distancia. !ue también habrá subvenciones para los que no pueden pagar. Esto hay siempre. ¿Pero creemos que sería más justo que la gente pague a un sistema kilométrico y ya lo estamos desarrollando en el pasado? No lo hemos, no lo hemos aplicado, pero en un par de años ya estará en marcha.

HT: Porque también yo vivía en Barcelona, por eso conozco un poquito el sistema y cómo funciona todo. ¿Porque no hay un billete anual o un billete anual?

LAV: No, no hay billete anual. Hay billete trimestral.

HT: ¿Por qué esa decisión?

LAV: No lo sé. Yo. Yo no creo en los billetes anuales. Yo no creo, yo creo que el billete. Es una cosa extraña. Para mí, es decir, la gente tiene diferentes necesidades durante el año. Entonces, en verano se van a otros sitios donde tienen otros sistemas tarifarios. Y bueno, entonces pagan un billete anual. Yo es que no, no lo veo. Es uno. No entiendo porque ese cine sí que veo el sistema más, yo creo que el sistema de tarifa para adaptar a lo que la gente se mueve. Otra cosa es que digamos no, el sistema de transporte público ha de ser prácticamente gratuito. Entonces sí, por un billete anual que pague un poquito y ya está. Y que hagan lo que quiera con el transporte público. Entonces no utilices. No puedes utilizar la tarifa para gestionar la demanda.

HT: Ajá, ajá. Entonces piensa que los billetes y obviamente también las billetes que ayudan a la gente con no hace mucho salario está. Está bastante bien. Funciona bien, en...

LAV: No funciona mal o no funciona mal. Queremos hacer cambios porque queremos que la tarifa modele más la demanda. Por ejemplo, no tenemos diferencias de precios hora punta y ahora valle. Nosotros, los técnicos, queríamos hacerlo, pero no nos dejamos político.

HT: Ajá. Vale, vale, vale.

LAV: Pero nosotros. Creemos que la hora punta debe ser más cara que la hora valle. Porque hay mucho físicamente... que va mucho... y hicimos una encuesta de muchísima más gente que coge la hora punta porque es la que le va mejor, pero podría ir a la hora valle... Y claro, vamos vacíos en la hora valle y totalmente repletos en la hora punta.

HT: Interesante porque he hablado con el de la autoridad de Zurigo y también ellos tienen un billete así para cortar la demanda y... Él me ha dicho que en eso no influye... No, no hace mucha diferencia a la demanda.

LAV: No, es verdad. Pero con que haga un 5% ya a mí eso me salva la vida.

HT: Vale, vale.

LAV: No, claro que ya lo sé. Porque la gente que lleva al niño al colegio, que si no le cambian la hora del colegio no va a ir una hora antes al colegio porque le va a costar dinero pagar la guardería. O sea que eso es evidente. Estamos hablando de. De, no, de mover a todo el mundo. Estamos hablando de mover a un pequeño porcentaje. A mí me baja un 5-10% la gente a la hora punta y estoy ya... Vamos, fantástico.

HT: Ok, perfecto. Pues seguimos. Ya hemos hablado antes sobre dónde estamos. La promoción de financiamiento de subsidios o ingresos de pasajeros. Vale, eso hemos hecho. ¿Cuál es su opinión sobre los subsidios? ¿Cómo se van a evolucionar en el futuro?

LAV: Se van a hacer más personalizados. Van a ser personalizados. Es decir... Con el nuevo sistema de billeteaje vamos a poder hacer el post pago. Podemos pagar después de utilizarlo. Por lo tanto, yo puedo saber qué ha hecho la gente, a qué hora, que qué problemas ha tenido y donde puedo hacer tarifas... Digamos mucho más a la carta. Es decir, si yo me rompo... Mi pierna... Y no puedo ir ahora mismo. No me cubre. No tengo ningún servicio, nada que me pueda ayudar a decir: "Oye, ¿cómo se ha roto la pierna?" Esta persona debe tener consideración de minusválido y por tanto le cuando le tengo que bajar el precio. Esto lo voy a poder hacer. Si estoy durante 15 días o si estoy 15 días con enfermo. Si puedo dar un papel que esos 15 días no me cobren el transporte público, un médico. No, hay que personalizar.

HT: Interesante

LAV: Esto da mucho más trabajo a las administraciones, sí, pero es lo que exige la gente... Lo que va a exigir la gente en un futuro personalizado.

HT: Interesante si se. ¿O que vea alguna desventaja o problema en el proceso de subsidio?

LAV: No, no, yo creo que esto es un tema social, no es un tema de transporte. público. Ni por tanto lo acepto. Lo que me gustaría fue esto que te digo, sé más, más, más adaptado y más claro. Pero es el sistema que teníamos hasta ahora de billetes que no lo permitía.

HT: Claro, claro. Ok, última pregunta: ¿Cuáles son los objetivos a largo plazo actuales de la ATM y cómo lo ve evolucionando con el tiempo?

LAV: ¿Los objetivos de la autoridad?

HT: Sí, o los objetivos a largo plazo actuales de la autoridad y también para mejorar el transporte público. Ya lo hemos mencionado algunas veces...

LAV: Sí, pero no, nuestro objetivo ahora mismo es un fundamentales llegar a todo el territorio equitativamente. Tenemos dificultad de llegar a las zonas de baja densidad. Estamos trabajando, y a las zonas que hay menos, menos servicio público, llegar allá mucho mejor. Integrar los sistemas de movilidad con el transporte público, integrar la bicicleta, integrar el coche compartido, integrar todo esto, esto. Estamos haciendo un proyecto, parar aquí dos años. Un proyecto de MaaS. Pero en el sentido de integración de servicios. Estos dos objetivos seguros y después los objetivos ambientales. El cambio climático y la contaminación son dos temas que en estos momentos están en todo, en nuestra... Delante de nuestro proyecto.

HT: ¿Y usted qué piensa? ¿Usted está contento con la evolución? ¿Como el camino... Decimos la velocidad, como se cambian las cosas, como se mejoran las cosas?

LAV: No, no, yo te entiendo. No, no hay un tema de financiación fundamental de dinero, de inversiones. Pasamos la crisis de 2008, que duró hasta 2014, y hemos cogido. Ahora de 2020, y estamos en 2023 y no, y aún estamos en crisis. Tenemos un problema importantísimo. Con lo cual se retrasan mucho las transformaciones. Vale. Y después también hemos de cambiar nuestras estructuras la digitalización, el teletrabajo. Hemos de cambiar las estructuras humanas, humanas como trabajamos. Y esto también nos cuesta y nos cuesta mucho el cambio social. Y de cómo trabajar nos está costando mucho.

HT: Ya son las 12. Pues nada, he terminado todas las preguntas. Muchas gracias. Y nada, pues yo cuando termino mi tesis, obviamente voy a mandarla al compañero, a la persona con cual estaba siempre en contacto, y espero que él avanza también la tesis. Así usted puede...