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Improving Coherence in a Cross-Border Public Transport System: Lessons from the Greater Copenhagen Region

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Abstract: Greater Copenhagen is often cited as a good example of cross-border cooperation. Shared historical contexts and socio-political willingness have meant that considerable resources have been invested into the development of infrastructure in this region. The Öresund fixed link constitutes the most important element of this infrastructure, facilitating a cross-border public transport system which ties the region together. This public transport system in turn underpins the social, economic and environmental sustainability of the cross-border region. The aim of this study is to investigate the issues at play with respect to improving the coherence of this cross-border public transport system, in relation to ticketing and public transport information in particular. This study comprises the compilation and analysis of the perspectives of the actors involved in and affected by the development of the cross-border transport system. In total, twelve semi-structured interviews were conducted. Six predominant themes emerged from the analysis of the empirical material: "Focus on the customer", "The Other Side", "Tidying up at home first", "Political challenges", "Back to basics" and "The low-hanging fruits". It became apparent that the prioritization of internal and organizational issues in the first instance could mean compromises, not only for cross-border cooperation but also for the customer's (the passenger's) experience. Results suggest that improvements to coherence in this transport system will most likely take the form of incremental changes and adopting common standards. This is opposed to the development of common systems, or of a significant departure from existing systems.

Keywords: cross-border; cooperation; transport system; ticketing systems; public transport information; Öresund; Greater Copenhagen

1. Introduction

Cross-border regions are characterized by many inherent challenges. Such challenges can include differences in languages, cultures, currencies, markets, labor market conditions, political visions and priorities and governance structures—to name but a few (see e.g., [1–3]). Cross-border regions face unique challenges in striving to bridge and facilitate these differences, in order to reinforce their socio-economic sustainability.

Greater Copenhagen is a cross-border region of approximately 4.3 million inhabitants comprising the east of Denmark and the south-west of Sweden [4]. During the last number of decades, and particularly in the last 20 years, this polycentric region has strived for integration. The development of its transport system forms a key part of this effort. Expanding the labor market, improving opportunities for housing and sustainable commuting, and attracting tourism function as core drivers for the development of this cross-border region [5].

Greater Copenhagen is often cited as exemplary in terms of cross-border cooperation (e.g., [6]). This is in part owing to the long-term vision which has allowed the region to grow as it has [7]. Shared historical contexts as well as strong socio-political willingness have meant that huge resources have been invested into the development of infrastructure such as the Öresund fixed link [8], which is one of the key infrastructure investments in the Greater Copenhagen region. This functions as a transport system tying the region together. Yet as a cross-border region, Greater Copenhagen is no different in terms of the challenges it faces [9].

Cross-border transport systems face their own rather unique challenges in that more than one jurisdiction, and usually several actors, are involved in the planning, operation and maintenance of the public transport system. Relatively seamless links from one country to the other are necessary in order to underpin cross-border travel. This applies to commuting in particular, which is a pre-requisite for labor market integration [5]. Finding ways to overcome these challenges and develop a coherent, functioning public transport system is, therefore, a central concern in cross-border regions.

The growing concern with congestion and other external costs associated with motor vehicle use such as air pollution, greenhouse gas emissions, energy insecurity, safety, health and social exclusion outcomes has led to increased policy interest in improving local and regional public transport [10]. Public transport attains a more efficient use of transport networks and provides a more socially equitable and clean mobility than private and motorized alternatives [11].

Promoting public transport quality and demand is one of the key goals of mobility policies targeted towards the sustainable development of cities and regions [12,13]. To this end, both land use and transport planning must be considered in an integrated way [14]. The current focus on sustainable travel in Europe includes policies which seek to increase and improve the accessibility of public transport in order to make it an eligible substitute for the car for daily travel [15], within and between cities and regions and across borders.

One of the key features for attracting car users is convenience: how simple the public transport services are to use and "how well it adds to one's ease of mobility /../ [e.g.,] the ease and simplicity of paying for and planning a [public transport] trip. Therefore, introducing integrated ticketing systems is considered a key strategy aimed at improving convenience of [public transport] services" [16] (p. 6).

For this study, we have focused on the challenges related to coherence in the cross-border public transport system in Greater Copenhagen. Issues related to ticketing and public transport information have been identified and highlighted as key challenges for cross-border coherence in this public transport system [17] and are, therefore, the primary focus of this study.

The main purpose of an integrated ticketing system is to make multimodal trips easy and attractive for users. It features the purchase of a single ticket that allows passengers to travel using different mode(s) of transport provided by one or more operators to give access to multimodal travel information and planning services [18]. It also involves pricing policies. To set appropriate fare system principles is not only an economic issue but also a core matter of public transport policy, since fare structures and levels have an influence on the attractiveness, accessibility, social inclusion and equity of the system. The most palpable issues in such integration efforts relate to coherent fares; zoning; ticket formats; payment types; validity; ticket inspection and validation; and legibility, as well as differentiation in terms of how these issues affect different groups of passengers [19,20].

The main purpose of public transport information (often referred to as "passenger information") is to provide information at stations, stops and on vehicles. It should be accurate, understandable, useful and timely (according to SIS/EN 13816:2002 [21]). Considering the travel chain perspective, public transport information can be split into at least four stages: (1) pre-trip information from origin to destination; (2) at-stop information; (3) onboard vehicle information; and (4) guidance to destination(s) and pre-trip information for return trip [22]. Issues are characterized by the sharing of information between authorities; different platforms displaying conflicting information; the provision of information in different formats; the punctuality of the information provided; the usefulness of the information provided; as well as particular difficulties when delays and/or disturbances in the system arise [20].

As part of this Interreg project, a recent study of passengers travelling over the Öresund revealed that, overall, passengers are generally quite satisfied [23]. However, there were reports of solutions that appear illogical (mainly with respect to public transport information). Solutions related to both ticketing and public transport information were described as confusing by several passengers. Inconsistencies with travel guarantees were also cited as problematic, as was the existence of many different platforms (e.g., applications, websites, and on-site information) with conflicting public transport information. Some passengers even highlighted their reliance on informal platforms for up-to-date public transport information, particularly when delays arise. These respective issues have differing levels of importance for different groups. For instance, it was found that, in general, commuters tend to draw on strategies based on their experience, and tend to be well-prepared in the event of a serious delay by bringing food with them or having a back-up plan [23].

The aim of the current study is to investigate the issues at play with respect to improving the coherence of the cross-border public transport system in the Greater Copenhagen region. This approach involves compiling the perspectives of the actors involved in and affected by the development of the cross-border public transport system, particularly with respect to ticketing and public transport information systems. Qualitative approaches involve the study of meaning through the exploration and description of phenomena and aid in the understanding of actors', users' and individuals' perspectives. In the current study, we explore certain aspects of cross-border transport and its inherent opportunities and challenges in a particular case. Therefore, with respect to the research aims and questions, a qualitative approach is more fitting. The following research questions are posed:

1. What are the challenges and opportunities for developing more coherent ticketing and public transport information systems in Greater Copenhagen?
2. Whose challenges and opportunities are they?
3. How are these challenges and opportunities perceived by the different actors with different perspectives?

2. Materials and Methods

2.1. A Qualitative Reflexive Methodology

A qualitative approach was engaged for this study. This was deemed appropriate in order to draw on and give an account of the experiences and perspectives of a limited number of key actors in a more in-depth manner.

Hermeneutical and post-structuralist frameworks were adopted in the form of a reflexive methodology, while framing the research, forming the research questions, designing the approach, as well as while analyzing the empirical material (see [24,25]). A reflexive methodology involves engaging a combination of destruction and reconstruction in the approach to the research problem [25]. This implies that the researchers, aware of their own pre-conceptions, build the research and engage with it on many levels. Reflexivity is intended to produce interpretations and challenge them, and allows for more modest, less naïve means of interpretation [25].

For this study, the participation of the interviewer(s)/moderator(s) as actors leans slightly towards a romanticist approach to the interview [25] (pp. 13–18). The epistemological and methodological stance is further elaborated on below.

2.1.1. Hermeneutical Aspect of the Reflexive Methodology

Hermeneutics draws largely on a "part-whole" anatomy of understanding, that is, the part can only be understood from the whole, and the whole only through understanding its parts [24] (p. 92). In other words, a researcher must continually look to the context in which the subject finds itself in order to understand it, and in order to understand the context, must understand its constituent subjects or parts. In terms of a transport system, this could refer to one representative/interviewee working on a particular aspect of the transport system with his/her own daily tasks which in turn shape and are shaped by her/his own perspective (forming the "part"). The "whole" could, in turn, relate to the entire context of the transport system (and its inherent pre-conditions and circumstances). The researcher availing of hermeneutics acknowledges their pre-understanding (shaped by their culture and academic background), and traverses between the part and whole and the pre-understanding and understanding throughout the research process [24] (pp. 96–97). The sources and material are treated as clues, in line with a hermeneutical framework [24] (p. 107).

Alethic hermeneutics argues that there is no certain objectivity in research; that every researcher is "culturally-conditioned" and everything is, as such, steeped in a subjective meaning which should be understood rather than definitively deduced [24] (pp. 94–95, citing Heelan (1997)). The process of understanding becomes as (or more) important than the product [24] (p. 98).

2.1.2. Post-Structuralist Aspect of the Reflexive Methodology

The framework of post-structuralism is based upon a critique of meaning and questioning where meaning comes from [24] (pp. 179–180). The nuances of language and its elusive meanings are inherent in this framework. It is argued that language is a much less fixed phenomenon than many of us would like to believe; that it differs depending on the context, depending on the individual, and even on the intra-individual level (for example, an individual may use the exact same expression to describe situations of varying severity). Language is treated as metaphorical and local and is not considered to have a stable and fixed meaning. Talk and meaning are considered to be loosely connected; words are not considered to have the competence to mirror reality [24] (pp. 201–204). Therefore, the researcher availing of post-structuralism is obliged to exercise extreme caution when working in the movement between language and meaning [24] (pp. 201–204).

A post-structuralist approach focuses largely on fragmentations rather than on patterns. A post-structuralist approach calls on the researcher to expect breakdowns or clashes between what is initially expected and what is ultimately found [24] (p. 192).

2.1.3. Application of a Reflexive Methodology

A reflexive methodology was employed for this study. In this case, meaning that the researchers drew on both hermeneutics and post-structuralism in the approach to the research problem, as described above. The part-whole aspect of understanding was engaged, as was the treatment of the material as clues to be approached with caution. During the analysis of the material, language was approached carefully, with fragmentations as opposed to patterns sought out. The two frameworks complemented one another in a reflexive manner during the research process.

2.2. *Design of the Empirical Study*

Informed by an exploration of the literature, key questions of interest were compiled and used to shape a draft discussion guide for the semi-structured interviews, which in turn served as the guiding document for this study (see Figure 1).

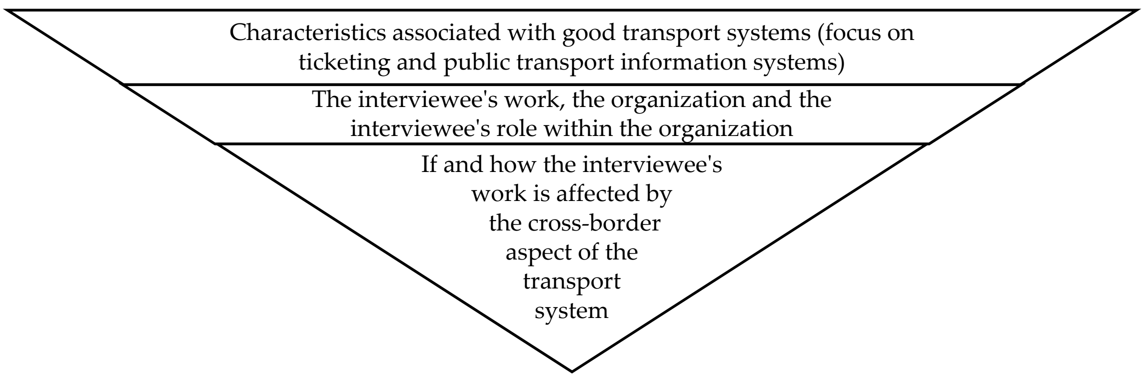

Figure 1. Discussion guide content depicted in a filter-like manner from broad to more specific areas of discussion.

This discussion guide was then tailored according to the type of interview conducted, and the corresponding interviewee. Sampling of potential interviewees took place during September–October 2019. In early November 2019, potential interviewees were contacted by email and/or telephone and given details about the scope of the study and its intended purpose.

In total, twelve semi-structured interviews were conducted with fifteen interviewees during November 2019–January 2020. Representatives from public transport providers, a partnership organization (an organization facilitating cooperation between transport providers), national transport authorities, public transport passenger interest groups, a tourist organization, a knowledge center, as well as a transport ministry were interviewed (see Table 1 for further information).

Table 1. List of interviews and corresponding information.

Interview	Representative(s) from Organization	Description of Organization	Side of the Fixed Link
A	DOT *Din Offentlige Transport* (Your Public Transport)	Partnership organization (facilitating cooperation)	Denmark
B	DSB and *Banedanmark*, Public Transport Information	Public transport provider and National transport authority	Denmark
C	Wonderful Copenhagen	Organization for the promotion of tourism	Denmark
D	*Passagerpulsen* (The Passenger Pulse)	Public transport passenger interest group	Denmark
E	Movia	Public transport provider	Denmark
F	DSB Sales and ticketing	Public transport provider	Denmark
G	Ministry of Transport and Housing	Transport ministry	Denmark
H	*Trafikverket* (Swedish Transport Administration)	National transport authority	Sweden
I	*Skånetrafiken* IT	Public transport authority/provider	Sweden
J	*Skånetrafiken* Pricing	Public transport authority/provider	Sweden
K	*Resenärsforum* (The Traveller's Forum)	Public transport passenger interest group	Sweden
L	*Øresundsinstituttet* (The Öresund Institute)	Knowledge center	Denmark and Sweden

Interviews were carried out at a range of different locations in the Greater Copenhagen region, and usually at the workplace of the interviewee. Of these twelve interviews, five were conducted in Swedish, six in a combination of Danish and Swedish and one in English. All interviews were recorded. The duration of interviews fell within the range 30–90 min.

All interviews were later transcribed in their entirety. The parts of the interviews which were in Danish were translated into Swedish by a professional translator prior to analysis. Potential issues related to translation were mitigated by consultation between the two researchers (where both were present for the interview) and with Danish language speakers.

2.3. Analysis of the Empirical Material

The analysis of the material comprised:

1. A basic thematic analysis;
2. A more in-depth thematic analysis; and
3. A form of content analysis.

The basic thematic analysis comprised the brief yet systematic analysis of the material, allowing predominant themes to emerge. The more in-depth thematic analysis comprised the further decomposition of the empirical material, giving more clarity to the definition of the predominant themes and allowing for well-defined sub-themes to emerge. The more in-depth content analysis allowed for links to be drawn and fragmentations to be identified between different elements of the text and themes. This in turn allowed for the subsequent revision of the thematic analyses. The thematic analysis informed the content analysis, with the content analysis in turn informing the definition and clarity of the predominant themes, in a part-whole, spiral-like development of the analysis.

2.4. Summary of the Research Process

A summary of the different stages of the research process is presented in Figure 2.

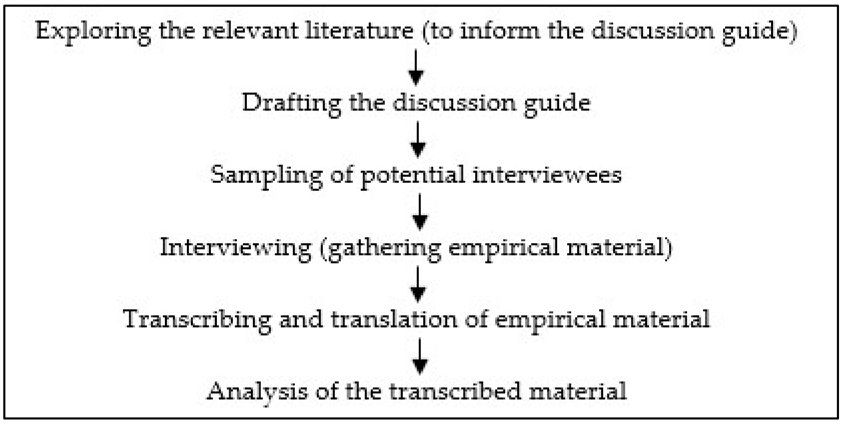

Figure 2. Stages of the research process.

3. Results

The following six predominant themes emerged from the initial thematic analyses, with the more in-depth thematic analysis and corresponding content analysis allowing for a number of sub-themes to surface.

1. Focus on the customer;
2. "The Other Side";
3. Tidying up at home first;
4. Political challenges;
5. Back to basics;
6. The low-hanging fruits.

Each of these themes is presented and outlined in detail as follows and synthesized in Table 2.

Table 2. Synthesis of findings by theme.

Theme	Main Findings
Focus on the customer	• a rhetoric of focusing on the customer • an emphasis on the role of digitalization and simplification • narratives surrounding agility, efficiency and the interests of the respective organizations • tensions regarding "the customer" • focus on relations between and across organizations first
"The Other Side"	• lack of communication, clarity or knowledge regarding what is happening on "The Other Side" • "we" and "they" narrative • distance between actors and corresponding difficulties in cross-border cooperation

Table 2. *Cont.*

Theme	Main Findings
Tidying up at home first	• prioritization of intra-regional and internal inter-regional cooperation • geographical differences in mandates • the remaining focus and energy may not be optimal in terms of the active pursuit and maintenance of cross-border cooperation
Political challenges	• a sense of the respective regions or countries turning inwards • some decisions framed as politically difficult • a recurring "we" and "they" narrative • a lack of explicit responsibility for cooperation
Back to basics	• expression of an explicit need to 'go back to basics' • expression of a need for staff on the ground • interest for the development of a combined app (on the Danish side) • calls for a greater focus on wayfinding and legibility • a latent sense of opportunities for the basic elements (e.g., reliability, maintenance of trains, basic public transport information) to be improved upon first
The low-hanging fruits	• a sense than an overhaul of the entire system (or systems) is not needed • common standards for public transport information were suggested • a sense that more incremental developments could function as an interim step • a notable sense of pride surrounding achievements with respect to the existing systems • having made investments in existing systems may be an obstacle for future alignment

3.1. Focus on the Customer

This theme was characterized by a rhetoric of focusing on the customer. This was drawn from several of the actors claiming to have "the customer" as their central focus. This rhetoric was very tangible on both sides of the Öresund, and often materialized as the interviewees posing lists of questions, from the customer's perspective, as if to illustrate the ways in which they reason internally within the organization when making discussions which will affect the customer. For instance:

> How can we help the customers? How can we do this in a better way? Can the announcements be improved? Can we give more directions? (Interview B)

> … a good ticketing system is that you don't start looking at the technical pre-conditions without talking to your customers and trying to capture what customers need. What kind of ticketing system do the customers need? Which functions need to be there? (Interview J)

It was argued that the customer is central to their work, with similar scripts from all actors presenting this claim. The rhetoric surrounding the customer was entrenched with a sense of "the customer" being one customer or a homogeneous set of people. However, this rhetoric was more nuanced in some of the interviews, with some interviewees emphasizing that customers are different, with differing needs and expectations (Interview F). This, in turn, hinted towards an awareness of giving the impression that customers are a heterogeneous group, and are thus treated as such.

There was an emphasis on the role of digitalization and simplification, and how the customer is central in these processes. Simplification and digitalization were cited as two processes sought after by the customer. This was tangible on both sides of the Öresund. However, a slight fragmentation was apparent here as it was unclear whether these efforts are in the interests of the customer (or indeed, which customers). On the Danish side, one interviewee referred to a "simplification agenda", which suggested a tighter link to a focus on the customer.

> For several years we have been in a digitalization process, so paper is disappearing more and more. (Interview B)

> ... we are going more and more towards the digital, away from the printed. (Interview B)

> ... [a public transport information system] should be as simple as possible /../ as little information as possible so that it'll be simple and fast ... (Interview H)

On the Swedish side, in the Scania region, the regional public transport authority has invested heavily in the development of their own combined application for trip planning and purchasing and displaying tickets. "Control" and "closeness to the customer" were cited as key reasons for doing so, linking back to the theme of a focus on the customer.

Moreover, narratives surrounding agility, efficiency and the interests of the respective organizations were rather prominent (especially on the Danish side), leading one to call into question whether the focus on the customer tends to somewhat drift into the background when other interests come to the fore.

While it was argued that the customer is central to the public transport authorities' and providers' work, some clear fragmentations in this rhetoric arose, making it clear that some aspects make the experience as a customer far from simple:

> What should I expect when I travel to Denmark? "Yes, it's awkward and there's a lot to keep track of!" If I'm 17 years old I'm not a child anymore, which I am in Scania. Then I'm all of a sudden an adult when I travel to Denmark. If I'm going to Sydhavn [a district in Copenhagen], well we've changed some zone there so it'll be more expensive. And then I also have to have a metro supplement, except only if I have a monthly ticket, except not if I have a single ticket. Yet there's the Rejsekort [Denmark's smart card] and then I have to have the supplement for that as well ... or you take the car or just drop it [the trip]. (Interview J)

Tensions regarding "the customer" were also rather apparent. Public transport passenger representative groups tended to question whether public transport providers really do have the customer (the passengers) as their main focus. The following quotation illustrates the lack of compatibility between zones and lags between communication across the border, and indeed how this adversely affects the passengers. With the previous quotation from Interview J illustrating all the various and varying aspects to be considered by passengers, the quotation from Interview D articulates that the passenger can then feel like a criminal having unwittingly "failed" to buy the right ticket:

> The zones in Denmark were changed almost a year ago. But it hasn't hit Skånetrafiken. /../ And that's just part of the incalculability. It should be easy to use public transport. Suddenly you're a criminal [when one unintentionally buys the wrong ticket] ... (Interview D)

This issue was again emphasized in Interview C, where the complexity of the zoning system and the difficulties this presents for customers/passengers (not least tourists) was highlighted. This, again, revealed a fragmentation between the focus on the customer and the experience for the customer:

> ... and then zoning system we have in Copenhagen ... it's completely ... , I mean we can't figure it out so the tourists can't figure it out... (Interview C)

An apparent strong focus on relations between and across organizations first served as a fragmentation in the narrative of having a strong focus on the customer. Public transport providers appeared to have a considerable focus on relations between and across organizations. This was particularly evident on the Danish side of the region. Here, a sense of friction between focusing on the customer and focusing on inter-organizational relations became rather apparent. Corresponding limitations for their work were emphasized by several actors. This meant that striving to meet the customers' needs (even in more nuanced ways) appeared to be compromised by having to focus on inter-organizational relations. Negotiations between different organizations appeared to be paramount and this was cited as consuming energy, with Skånetrafiken arguing that they nonetheless have a greater focus on the customer (in their case, passengers) than other actors:

> In Sweden information on the platforms is handled by Trafikverket. And then there is another partner we cooperate with. And we have different operations models, you could say, with different ways of working. And Trafikverket handles its part, and we at Skånetrafiken maybe think a bit more about the customer, that perspective. (Interview I)

This quotation suggests that it could be perceived that some organizations' efforts to focus on the customer could be compromised by others' split focus (or having a different perspective on who "the customer" is). This was echoed by Trafikverket, where it was argued that their customers are not in fact passengers, but the public transport authority and providers:

> ... passengers are not our customers. Skånetrafiken and Öresundståg [a common rail network in southern Sweden and Denmark] are. The passengers are the customer's customer, so to speak. (Interview H)

Others, from both the public transport provider perspective and customer/passenger perspective consider that this focus on inter-organizational matters is a negative development and question how the customer could possibly be the main focus when there are politics in the mix (regarding the Swedish context only). Here, a fragmentation between focusing on the customer and having focus elsewhere was rather apparent, illustrated in the following quotation:

> The ticketing system is extremely fragmented and that all the regions, more or less, have their own system. Why? We don't know. It could be politics, the municipal or regional autonomy. Everyone wants to have their own optimal ticketing system ... (Interview K)

Similar issues were apparent in terms of cross-border cooperation efforts, with the difficulty associated with different types of governance emphasized in Interview F:

> In other words, it's difficult when you have one [type of] governance in Sweden, one [type of] governance in Denmark and one that should be common. What are the best solutions for the customer? And that is what we are trying to play it by ear towards. (Interview F)

However, it was argued that these cross-border challenges should not translate into challenges for the customer. It was further argued that these issues should in some way be overcome:

> The aim is really that people should not need to be aware of "here is a /../ border". You should be able to travel and get around regardless ... (Interview J)

This consideration was somewhat echoed by the customer/passenger perspective. Here, we have another clue suggesting that the focus on the customer is not as central as it could be, and causing us to question whether the focus on the customer should not trump such challenges:

> So if we really want to have this integration over the border, then we have to also set aside the resources that are required to get it to work. I think that the biggest problem is mental. It is a mental challenge more than a technical challenge. Because it is possible to find a technical solution. (Interview D)

3.2. *"The Other Side"*

There was an apparent lack of communication, clarity or knowledge (or lack of all three) regarding what is happening on "The Other Side" (on the other side of the Öresund fixed link to where the interviewee was based). This theme was rather evident with respect to key areas such as changes to zones, or even train movements, particularly in relation to delays or disturbances in the network.

This theme could relate to the issue of some activities being carried out in close cooperation with one another, with others carried out separately. For instance, it became apparent that planning is carried out separately on either side, but traffic/operations is managed in cooperation with one another:

> ... A deficiency could be that long-term planning does not account for future measures on both sides of the Öresund. (Interview H)

There was a recurring theme of "The Other Side" being something out of reach, and, indeed, outside of the mandate for many actors. This theme was reinforced by a "We" and "They" narrative, with some interviewees actually using this expression to underscore how they perceive there to be a tangible distance between the two sides with respect to certain aspects of cooperation, with Interview F from the Danish side articulating this theme as follows:

> I would say that we are quite divided. Skånetrafiken has developed its system. We haven't had anything to do with that. So we are involved in our own, that is, what DSB offers. (Interview F)

> It is not as though we develop [solutions] together. It [development] happens within Skånetrafiken or within DSB. (Interview F)

Similar feelings were apparent on the Swedish side, with some of the challenges involved in the cross-border cooperation emphasized:

> My experience [in our development process] was that I didn't see any signs that they wanted [to cooperate]. (Interview I)

Potential explanations for distance between actors and corresponding difficulties in the cross-border cooperation were presented in Interview L:

> In Sweden, the Öresund rail traffic and the cross-border traffic is mainly run by Region Scania through Skånetrafiken and Öresundståg [cross-border rail network]. That means that the Scanian regional council are to negotiate with the Danish Transport Ministry. Or that civil servants within a region are to negotiate with civil servants at a ministry. This is an imbalance of power and this often poses some problems. (Interview L)

For other actors within Denmark, that the region in which they operate is connected to Sweden is rather unimportant, even though it is of particular importance to one of the key actors in the region:

> Interviewer: "What about the fact that the transport system is connected to Sweden?"
>
> Interviewee: "I would probably say that it doesn't really matter for [us] [...]" (Interview E)

3.3. Tidying Up at Home First

The prioritization of intra-regional and internal inter-regional cooperation was a key concern for most actors. There was a clear sense of the actors having a lot to deal with in terms of ensuring cooperation between different organizations within the respective regions. This was particularly apparent on the Danish side. This was also linked to ensuring cooperation between regions within the respective countries. It became rather clear that ensuring intra-regional and inter-regional cooperation internally (within the respective countries) consumes a lot of focus and energy. One interviewee on the Swedish side illustrated the inter-regional challenges internally as follows:

> Yes indeed, that's how it is [tensions between the local, regional and inter-regional ticketing systems or public transport information systems]. And that is not only between Denmark and Sweden, but it is between [regions in southern Sweden]. They choose their own ways of doing things, and Skånetrafiken chose its own way of working with its development. So not even in this small, small country, Sweden do we come to an agreement. (Interview I)

This is also articulated as a cause for concern from a passenger interest group from the Danish side:

> It is definitely not just about the border, but also the interface on the Danish side. Even in Denmark there are systems that do not "speak to each other", and where you are forced to create special links between different systems to get it to work [. . .] (Interview D)

The fact that so many actors are involved (and not just one lead organization or actor), particularly on the Danish side, was somewhat lamented on the Swedish side (articulated in Interview I):

> Had there been one lead organization in Denmark, then we would probably have more easily come to an agreement. (Interview I)

Geographical differences in mandates (particularly in Denmark) were also cited as presenting problems. It was further implied that, only after cooperation within the actor's mandate, or between regions internally, is prioritized, can focus and energy be invested in cross-border concerns:

> But I also have that requirement /../ and that's Zealand. But is it really the case that DOT, which is a cooperation [partnership] within Denmark, should cooperate with Sweden before one cooperates with [regions within Denmark]? (Interview A)

It was also emphasized that on the Danish side, the differences in the geographical areas corresponding to the respective actors can present challenges:

> DSB is in the whole country and even outside of Denmark, the metro is just in Copenhagen and we have the whole of Zealand. So in that respect, we are very different. We are also very different in our ownership structures. (Interview E)

Investing large amounts of effort in intra-regional and internal inter-regional cooperation could, in turn, mean that the remaining focus and energy may not be optimal in terms of the active pursuit and maintenance of cross-border cooperation.

3.4. Political Challenges

A sense of the respective regions or countries turning inwards rather than towards one another was another rather apparent theme. However, this was referred to as a bigger trend in Europe and worldwide, and not something that is specific to the Greater Copenhagen cross-border region.

The border controls which were introduced in 2015 and 2016 were described as, at least initially, very difficult for commuters, especially those commuting by public transport, with one interviewee even citing a link between the introduction of the border controls and effects for quality of life (Interview L).

Some decisions were framed as being politically difficult and very tightly linked to internal issues (within the respective regions and beyond), particularly with respect to infrastructure. This theme was linked to a recurring "We" and "They" narrative, as mentioned previously.

> It is as such a sensitive area politically speaking, with respect to domestic politics. (Interview L)

Efforts and interest on the national level (in Sweden) were also called into question, with one interviewee highlighting that there is insufficient focus on cross-border travel from Sweden centrally, on the national level:

> . . . there is not enough "attention" [from the national level in Sweden, on cross-border travel] /../ but if Greater Copenhagen can contribute /../ then we have something interesting in progress. (Interview I)

Furthermore, there appeared to be an apparent lack of explicit responsibility for cooperation with respect to certain issues. For instance, some issues surrounding the sharing of public transport information seemed to be linked to a lack of defined and explicit responsibility, although it was highlighted that ample opportunity exists. This could suggest a link back to political willingness, or indeed a lack of awareness among some decision makers. The same issue was raised for ticketing systems in Interview L, except here disinterest was cited as the issue at hand:

> I don't think it's to do with an unwillingness [why the ticketing systems are the way they are]. I think it is about a bit of disinterest. (Interview L)

3.5. Back to Basics

Several interviewees expressed an explicit need to "go back to basics" with respect to certain aspects of cross-border public transport provision. It was highlighted that instead of focusing on and investing in common ticketing and public transport information systems, some more rudimentary elements of the transport system should be improved upon. Some interviewees highlighted how, in some cases, there is too much distance between the public transport actor and the problem (particularly with respect to public transport information and delays). These same interviewees questioned whether there is just too much automation and no one physically on the ground to deal with such issues when they arise:

> An extreme amount has been centralized; traffic management, control systems and things like that. The people who report service disruptions are located very far from the place [where service disruptions occur]. So for a number of reasons the information is not correct. (Interview K)

The development of a combined app, such as the one developed in Scania, was sought after on the Danish side, this in turn being considered more basic than the development of a common transport system. Other actors highlighted how wayfinding and legibility (particularly for tourists) should be a more central focus in terms of the development of the transport system.

> So what we're really looking for is like an app where you could both plan your journey, but also buy your ticket. And definitely the Scania one [Skånetrafiken app] is the best one, but getting the Danish side to admit that... I can feel it is difficult to agree on one system. Exchange rates and currency, it's another layer of complication.' (Interview C)

Overall, there was a latent sense of opportunities for the basic elements (e.g., reliability, maintenance of trains, basic public transport information) to be improved upon first before making any more significant or ambitious investments.

> I don't think that it [coherence in systems] has as much of an effect as the train coming on time, if they [trains] break down, if they are overcrowded or if there are seats [available]. I think this trumps everything. (Interview L)

3.6. The Low-Hanging Fruits

There was an overall sense of there being no need for an overhaul of the entire system (or systems) with respect to public transport information and ticketing. Several interviewees instead highlighted that small, incremental changes can be made to some key areas where investments have already been made. This emerged as a core issue, and a preferred ambition level for the improvement of coherence in the cross-border transport system. A key quote for illustrating this was:

> This is the low-hanging fruits. I think that a person has a lot to contend with on each side with their own systems, but the things a person has can be made accessible for the other and used in the best way. I think this would be a huge leap forward. (Interview B)

For instance, it was suggested that common standards for public transport information (e.g., the same information but in different formats) could be agreed upon. It was highlighted that instead of a common system, a way of allowing the systems to effectively talk to each other could be a focus for investment. This included the endorsement of the EU standard as a framework for developing the cooperation and making the presentation of public transport information in Greater Copenhagen coherent. From the Danish side, emphasis was placed on what the EU standard does and does not cover. The simplicity of implementing such a measure was articulated as follows:

> … what do you need from us and what do we need from you? (Interview B)

This same simplicity was echoed from the Swedish side, but in terms of ticketing systems. However, it was also mentioned that this issue is not prioritized, hinting back to the difficulties in terms of efforts put into cross-border cooperation.

> /../ Validation … of Danish tickets … is of course possible to build into our validation app. We just don't have time at the moment, I think that's what it's about. And there is a willingness from both actually, both from Denmark and from us, to make this happen. (Interview J)

Several interviewees made the point that common systems are not really "on the table" at the moment, and that more incremental developments could function as an interim step in this direction.

> If [our choice of standards should be able to communicate] […] then I think we must allow for it to be different systems. (Interview J)

Overall, there was a notable sense of pride surrounding achievements with respect to the existing systems (this applied to both sides). However, this pride seemed to be fragmented by a sense of things moving too slowly, in terms of developing more effective solutions:

> … we have to be much more concrete and formulate these issues [improvements to coherence] as otherwise it's just philosophy. (Interview B)

It was further emphasized that having made large investments in existing systems may be an obstacle for future development and alignment:

> There is a risk that you can end up in a situation where a large investment increases the aversion towards making new, better solutions that make the old investments worthless. (Interview L)

The scope for incremental development towards integrated and seamless cross-border transport systems appears to depend heavily on searching for and identifying low-hanging fruits, as well as realistic approaches. As one of the interviewees stated:

> You can't be too gloomy [about the situation], but instead look a bit more at the opportunities. You can't be too naively positive either. /../.. (Interview L)

4. Discussion and Conclusions

4.1. Meeting the Aims of the Study

The aim of this study was to investigate the issues at play with respect to improving the coherence of the cross-border public transport system in the Greater Copenhagen region. Particular emphasis was placed on ticketing and public transport information systems. This study comprised the compilation and analysis of the perspectives of the actors involved in and affected by the development of the cross-border transport system. Six predominant themes emerged from the analysis of the empirical material: "Focus on the customer", "The Other Side", "Tidying up at home first", "Political challenges", "Back to basics" and "The low-hanging fruits".

It became apparent that the prioritization of internal and organizational issues in the first instance could mean compromises, not only for cross-border cooperation but also for the customer's (the passenger's) experience, while our findings suggest that improving coherence in this transport system will most likely take the form of incremental changes and adopting common standards, as opposed to the development of common systems.

4.2. Our Results in the Context of the Literature

The main purpose of measures to improve coherence—such as an integrated ticketing system—is to make multimodal trips simple and attractive for users [18]. Improving coherence in transport systems involves the adoption of various policy and usability requirements [19,20,22]. Cross-border transport systems face several challenges in this respect, with many different actors on different levels required to cooperate, negotiate, adapt and compromise despite differences in languages, cultures, currencies, markets, labor market conditions, political visions and priorities and governance structures [1–3].

Our findings indicate that although a focus on the customer (the passenger) appears to be at the core of the work of most actors, other issues such as inter-organizational and intra- and inter-regional cooperation tend to come to the fore. Our findings suggest that while the rhetoric of having a focus on the customer is rather prominent, compromises and limitations appear to restrict the scope for action of the actors, in turn limiting the extent to which focus can be placed on improving the passenger's experience.

Interviewees, with a few exceptions, tended to emphasize their own perspective (or the perspective of their organization), often framed by governance aspects and institutional barriers, despite the explicit aim of placing "the customer" at the forefront.

One of the core drivers for Greater Copenhagen is the expansion of the labor market through the improvement of opportunities for housing and commuting for the development of this cross-border region [5]. Seamless links are necessary in order to support such cross-border commuting, and the subsequent integration and expansion of the labor market. There are several obstacles to be tackled before cross-border mobility in the Greater Copenhagen region could be characterized as being seamless [23]. Despite this, the travel chain for the customer (passengers) was–with a small number of exceptions–not salient in the empirical material.

The region continues to plan for sustained integration, with recent years having seen discussions and early-stage studies regarding possible means of alleviating pressure on the existing fixed link. Given the importance of freight transport in Europe [26], such discussions have focused on the need to facilitate freight transport alongside growth in the demand for public transport in the region [27]. However, overall, our results suggest that the region's constituent parts are moving further apart rather than closer together. In the interviews, it was emphasized that this trend is not due to lack of will or engagement but instead external forces, and a trend that is tangible worldwide. Prioritization of internal issues in the first instance, requiring a considerable amount of energy, represents a clear limitation. While an unwillingness to venture too far from existing investments functions as an argument for incremental changes and shared standards, as opposed to investing in common or joint systems.

4.3. Methodological Issues

As outlined in Section 2, a reflexive methodology was employed for this study. This involved engaging a "part-whole" anatomy of understanding [24] (p. 92). This meant striving to understand the whole situation (and thus the context) by pulling together the different perspectives of the actors involved. This approach involved an effort to engage in a part-whole understanding mechanism (consistent with hermeneutics), while at the same time, decomposing the investigation into its constituent parts, which are combined to comprise "the whole".

Furthermore, a hermeneutical approach considers more delicately the interviewees' willingness to convey "the truth"; whether they may be hesitant or unwilling to disclose their actual perceptions; whether there is any reason to doubt the accounts that are given, and so forth [28] (pp. 221–225); [25] (pp. 100–101). In this sense, the information presented by the different actors was treated with care and always placed in the context in which it finds itself [25] (p. 100).

Consistent with the framework of post-structuralism, the use of language was questioned, as were the meanings of or inconsistencies in what was conveyed by interviewees. In this sense, the transcripts were not treated as having a standardized meaning. The possibility that shifts in meaning took place during the course of the interviews was also central to the analysis.

4.4. Concrete Steps towards Improved Coherence

Our findings point to the need for the formalization of the cooperation and coordination between actors on both sides of the Öresund. One step towards such a formalization could be the allocation of explicit responsibility for cooperation and coordination at the respective organizations. This is with respect to both ticketing and public transport information systems. Several actors and organizations would most likely need to be involved in such a formalization process; a task that could be facilitated by and through Din Offentlige Transport (DOT) (or an equivalent) which is the partnership organization currently facilitating cooperation within the region of Zealand in Denmark.

The establishment of a dedicated and official cross-border user forum or panel comprising different user types (e.g., daily commuters, airport users, weekend visitors, tourists and business travelers) could strengthen the focus on the customers (the passengers) and their specific perspectives at the organizations, in turn consolidating the focus of the cross-border cooperation and its sustainability. This would also allow for longitudinal analyses to be carried out, and for new policies and provision changes to be "tested" among user groups who face the rather unique challenge of travelling between two countries.

Through the adoption of such concrete steps, a clearer structure for the development of the coherence of the transport system, and integration of the cross-border region could be established. This could, in turn, secure more sustainable commuting alongside the socio-economic sustainability of the cross-border region. The continued integration of the region requires a multidimensional approach involving a large number of different sectors and actors, with the transport system comprising just one part of this complex effort.

4.5. Epilogue

In April 2020, the Swedish government published its report on the analysis of the potential for the introduction of a national ticketing system for the whole of Sweden [29]. Such a ticketing system would no doubt have implications for the Greater Copenhagen region and efforts towards coherence in the respective ticketing systems. If and how such a national ticketing system, if introduced, would affect the transport system in Greater Copenhagen remains to be seen.

Since this research was carried out, the ongoing situation with the Covid-19 pandemic has brought with it considerable challenges for the Greater Copenhagen region, with the temporary closure of the border towards Denmark for all non-essential trips originating in Sweden, extensive border controls and corresponding changes to the supply of cross-border public transport, with the Swedish Department of Foreign Affairs advising against non-essential travel to all countries including Denmark (from March 2020), later revised to exclude some countries [30]. These measures could mean potential short and long-term impacts for this region and its integration—not least for the integration and expansion of the labor market, as well as for public transport provision and use. These impacts could, in turn, imply further challenges for efforts towards improving the coherence of the public transport system. The sustainability and resilience of the public transport system, and the region as a whole, will no doubt feature as a key element of the discourse going forward.

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