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Understanding the process of improving accessibility and affordability of inter-municipal bus transport system

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Abstract

This paper examines the ways an inter-municipality bus system for passengers improved its accessibility and affordability for end-users at regional level. Using archetype theory, we conducted a case-study in FÖLI, a not-for-profit organization tasked with collective transport of passengers by bus in Southwest Finland. We find that FÖLI implemented a radical revolutionary change by introducing a new framework for the carriage of passengers by bus at a regional level, in which a zone free and flat fare policy applies. The sequence of change became central; with a continuous reorientation linearity aiming to improve the accessibility and affordability of collective transport by bus for commuters. The paper contributes to archetype theory by examining the relevance of accessibility and affordability in the configuration process of designing and implementing change, and extending knowledge in this area. Specifically, for the first time, our research shows the way in which FÖLI used the accessibility and affordability policy as an interpretative scheme to design and implement the change process successfully. The practical implication is that municipalities understood the relevance of improving collective transport infrastructures (roads, systems and technologies) to attract commuters as a way of saving total costs to fund underperforming buslines.

Keywords Archetype theory, Affordability, Accessibility, Costs, Municipality, Public sector, Transport, Finland

1 Introduction

Many cities around the world encounter challenges in organizing collective transport systems to efficiently carry passengers to different parts of the city. Besides public policy and managerial challenges, such as privatisation [16] and transport costs [24], recent research has also highlighted issues related to traffic safety [23] and institutional barriers that cause discrimination [19]. Further research is needed to investigate the factors that

facilitate or hinder the accessibility and affordability of collective transport systems for commuters [4, 5, 31].

This study aims to address this gap by examining how a group of municipalities implemented inter-organizational changes that enhanced the accessibility and affordability of commuting by bus in the FÖLI region. FÖLI is a not-for-profit inter-municipal organization responsible for managing the carriage of bus passengers in Southwest Finland. Specifically, this study seeks to answer the following question: How does a collective transport organization efficiently organize accessible inter-municipal carriage of passengers by bus at an affordable cost for commuters? We define accessibility to be the ease with which a person who needs to commute can do so [5]. We define affordability in terms of the bus fare that a commuter has to personally pay (11).

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To answer the question, the study uses archetype theory [9] as a conceptual framework to theorize and analyse relationships between key-concepts, such as accessibility, affordability, the process of change, and outcome. Archetype theory is relevant because it provides tools to conceptualize and analyse change as a paradigm of organizational configuration [33]. According to Greenwood and Hinings [9], one needs to apply a holistic approach to understand organizational change design. Change is the process of moving from one archetype to another completely, partially, or in parallel. Parallelism happens when a new archetype is added to existing ones [9]. Secondly, relationships or patterns between archetype structures and systems depend on ideas, beliefs, and values (i.e., interpretative schemes) that shape systems and structures in a specific way. Hence, an archetype includes systems, structures, and their interpretative schemes [17].

Another merit of archetype theory is its capacity to analyse change at societal, organizational, and individual levels [9, 29]. Previous studies have successfully applied archetype theory to examine change in public sector organizations, such as municipalities [14, 21, 22], public-private partnerships [27], professional service organizations [17], and health care management [15]. This paper builds on these studies and contributes to archetype theorizing by examining the relevance of accessibility and affordability in the configuration process of designing and implementing change, and extending knowledge in this area. Specifically, for the first time, our research shows the way in which FÖLI used the accessibility and affordability policy as an interpretative scheme to design and implement the change process successfully. Moreover, the paper makes an empirical contribution by utilising data from FÖLI to examine how the archetype analysed reduced commuting costs funded by municipal tax revenues. Our qualitative case study revealed that FÖLI mobilised different groups of stakeholders (including commuters, political decision makers, public officials, and competitive private operators) to design and implement a radical revolutionary change in the carriage of passengers by bus at a regional level. This change involved introducing a new framework with a zone free and flat ticket policy in mid 2014. The implementation of this policy improved the affordability of commuting by bus within the FÖLI region. Furthermore, the right of each municipality to influence bus schedules and bus stop locations improved the accessibility of buses for both regional and urban commuters. The central focus of the sequence of change was to continuously reorient towards improving the comfort of end-users. A practical policy implication of our findings is that municipalities have recognised the importance of improving collective transport infrastructures such as roads, bus stops, ticketing systems and bus-check-in technologies. This

understanding can attract more commuters, leading to cost savings in funding underperforming bus lines.

The next section elucidates the theoretical framework, followed by a discussion of research methods, data, findings, discussion, and conclusions.

2 Theoretical framework

2.1 Conceptual framework

There are two different schools of thought in archetype theorizing, that is, the psycho-analysis paradigm promoted by Carl Gustav Jung [18], and the organizational configuration paradigm [9, 33]. This study contributes to the latter, as we aim to analyze how municipalities can design and implement a smart and sustainable policy to attract more people to commute at a flat fee rate throughout the FÖLI region. Therefore, our research focuses on inter-organizational (re)configuration. Additionally, while archetype theory has attracted many researchers, no one has investigated how accessibility and affordability, as a change policy, can shape and alter interpretative schemes that were institutionalized prior to the change process.

The organizational configuration paradigm encompasses many branches, including the so-called strategic group, generic strategies, organizational forms, archetype, typology, and taxonomy [33]. While a full explanation of each branch is outside the scope of this paper, it is important to note that the primary difference between the generic and strategic groups, and the archetype and organizational forms, is that the former examine competitive strategies, while the latter investigates organizational features. Another important distinction is that the archetype and strategic groups are context specific, whereas the generic strategies and organizational forms emphasize empirical generalization [33]. We argue that the strategic configuration approach would not have provided us with sufficient conceptual tools to analyze the change process in question, which involves many actors and perspectives, in addition to strategies. In contrast, by applying the archetype theoretical approach, in addition to strategy, we were able to include new concepts such as organizational context, accessibility, affordability, management control systems and governance mechanisms [9; 13]. Figure 1, below, illustrates our theoretical approach.

Archetype theory has proven to be a robust tool in analysing organizational responses to macro and micro organizational pressures for change [14, 20, 21]. Institutionalization of an archetype can yield a powerful tool that shapes the thoughts and actions of organizational members within an evolving interpretative scheme [9]. The outcome of change can be radical, that is, replacing an old archetype with a new and different one; or incremental, that is, introducing a new archetype that does not substantially change existing ones [17].

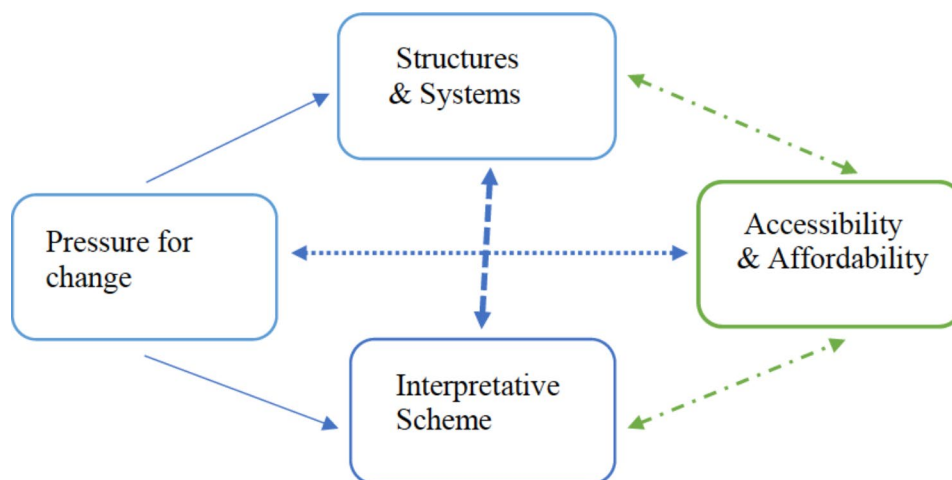


Fig. 1 Theoretical approach. Source: Authors' own design

Moreover, archetype theory offers three additional conceptual tools that are useful in analysing intra-organizational dynamics and rationalities that influence change and its outcome. These are the pace, sequence, and linearity [3]. Pace pertains to the speed or time dimension of change and can be either fast for revolutionary change or slow for evolutionary change. Sequence refers to the strategies used to implement change, and can be either central or peripheral, with a central sequence prioritizing the changing of central systems, structures, and their interpretative scheme before peripheral ones. In the contrary scenario, the sequence is peripheral to central [3]. Abbott [1] recommends analysing the sequence of past events in a specific organization before examining the ongoing change process [1]. Linearity pertains to the tactics used to move from one archetype to another, with inertia, reorientation, discontinuity, and unresolved excursion tactics being the four options. Inertia occurs when the new archetype does not change old ones, whereas discontinuity occurs when the new archetype replaces old archetypes. Reorientation occurs when change gradually moves from the old archetype into the new one. When reorientation does not completely abrogate the old archetype, the change becomes an unresolved excursion [13].

For instance, Liguori and Steccolini [22] found that although two Italian municipalities faced similar extra environmental pressure for change, the intra-organizational change dynamics in each municipality differed, which significantly influenced the outcome of change. Consequently, the change was radical in one municipality and incremental in another. Mutiganda et al. [27] found that the process of implementing public-private partnership policies in the public water sector of an East African country was revolutionary at the national level (fast and central) and evolutionary (peripheral and slow) at local levels. Hyndman and Liguori [14], in their

analysis of change in Scottish and Westminster governments, explained that radical (and revolutionary) change at organizational level was not possible unless pushed by those with superior power or authority (i.e., difficulties in changing the old interpretative scheme). During the Covid-19 pandemic, Jayasinghe et al. [15] analysed how Sri-Lanka's government changed the interpretative scheme of its Incident Command System archetype by including new actors and new ideologies, allowing the changed archetype to manage the first wave of the pandemic effectively.

2.2 Archetype theorizing in passenger transport literature

Few collective transport scholars have used the word "archetype" as a conceptual tool to categorize items under investigation. For instance, Navarro-Ligero and Valenzuela-Montes [30] employed the scenario archetype concept in their research on planning future urban developments of multimodal transport infrastructure in Granada, Spain. Their investigation aimed to scrutinize how transport policy narratives and political debates during the design process of the integration of a new Light Rail Transit (LRT) in the city would be understood when analyzed as either a flexible or robust scenario archetype. They conceptualized several urban and rural transport development scenarios under each archetype and conducted a survey in Granada to obtain feedback from the people, as future end-users, on specific sets of scenarios. The research revealed that LRT integration into transport and mobility models in urban and regional planning (i.e., the flexible LRT archetype) or as an independent LRT program (i.e., robust LRT archetype). Although the robust LRT archetype could offer competitive advantages, such as being more cost-effective and sustainable, Granada city followed a flexible LRT archetype model, designing LRT to continuously provide adaptive

solutions to inter-modal connections and platform integrations (i.e., accessibility of mobility). Navarro-Ligero and Valenzuela-Montes's [30] study's merit is showing the relevance of archetype theory in scenario planning in the context of future urban and regional multimodal transport. Our study builds on this by examining how an already planned scenario archetype becomes implemented in practice.

Sundqvist-Andberg, Tuominen, Auvinen, and Tapio [34] used a sustainable business model archetype to investigate how e-scooter companies operating in the five largest cities in Finland utilize their business models to contribute to sustainable urban mobility. The archetype approach was conceptual and analytical and helped to systematically collect and analyze opinions of e-scooter operators, city authorities, and public transport authorities. Their findings demonstrate that each e-scooter operator provided sustainable value to the public by sharing information and focusing on improving environmental sustainability. However, e-scooters could also cause health related harm to the community if their increased usage leads to reduced walking or discontinuing the use of bikes or electric bikes. Although Sundqvist-Andberg et al's [34]. paper contributes to passenger transport literature by highlighting the relationship between mobility, accessibility and sustainability, it does not offer further analysis of how the e-scooter business in Finland has become an archetype of its own right, as the business is still at an early stage. Our study provides a theoretical contribution to Sundqvist-Andberg et al's [34]. work by analyzing the process through which inter-municipal collective transport policy was designed and implemented to deliver an independent collective transport archetype in Southwest Finland.

2.3 Accessibility and affordability in archetype theorizing

Our literature review revealed a gap in the use of archetype theory in relation to accessibility and affordability in the field of collective transport of passengers. However, Coppola et al. [5] provided relevant insights on how to conceptualize and analyze what they described as the accessibility gap between national tourist sites and transport infrastructures (by road, rail and air) in Italy. More precisely, Coppola et al. [5] developed a model that measures accessibility challenges and financial investments needed to address them, using two metrics of utility accessibility measure at the individual level, that is, trip based measure and activity based utility time/space measure. A common aspect to both measures was the schedule of the mobile utility used and how a commuter could benefit from such as a schedule or not when moving from one area to another. The accessibility time from one location (such as a private home) to the mobile utility site (such as a bus or train terminal or stop or an airport), and

the time needed to reach a specific destination within a specific zone or region were also included. Coppola et al. [5] tested quantitative models to measure accessibility gaps to inform decision makers on where and how to invest in improving the mobility accessibility gap at the national level in Italy. They called for further studies analyzing accessibility and the cost of travel (i.e., affordability) at regional and local levels. Our study fills this gap by examining how an inter-municipal policy for accessible and affordable collective transport of passengers by bus became implemented in FÖLI and its outcome.

Guzman and Oviedo [11] argue that transport costs (that is, affordability) are one of the major factors that can hinder the accessibility of low income households to collective transport systems, especially in the least developed countries. They analyzed the effectiveness of the Government of Bogota's policy to institutionalize a collective transport subsidy scheme for low income households. Using a scenario research methodology, their findings showed that the pro-poor transport policy analyzed had the potential to improve affordability, and accessibility for low income households to collective transport infrastructures. This, in turn, could gradually reduce the gap between the poor and the rich, and reduce inequalities in accessibility. A policy implication was to promote collective transport policies that enhance a social and moral approach to inequalities.

Interdisciplinary studies have demonstrated, however, that there is often a discrepancy between political intentions to design public policies and what occurs during their implementation [6, 8, 26, 28, 36]. The literature suggests that while systems and structures can be designed to be inclusive, the empirical outcome depends on how values, beliefs, and attitudes of powerful organizational members welcome and implement the change in practice [8, 14, 28].

Consequently, we argue that affordability and accessibility are relevant components of the interpretative scheme that shape and influence how a specific policy can be designed and implemented to become an independent archetype. For instance, Agriesti, Soe, and Saif [2] did not apply archetype theory specifically to investigate factors that enable or hinder the implementation of smart mobility policies in low density areas (rural and small suburb centers) of Estonian municipalities. Nevertheless, their findings reflect issues related to the systems and structures of the smart mobility system investigated and their interpretative schemes.

Hernandez and Monzon [12] applied an end-users approach to investigate functional and psychological factors that end-users perceived to increase or decrease their satisfaction when commuting in urban interchange systems. The findings showed that waiting time, comfort (air and noise quality), and facilities (free wi-fi) during

interchange increase or decrease the attractiveness of regularly using collective transport utilities. Hernandez and Monzon's [12] findings, indicate that additional factors contribute to commuting accessibility for end-users. For example, transport costs [4, 19, 24] and traffic safety [23] are also factors that enhance the accessibility and affordability of collective transport for commuters.

3 Research methods and data

The qualitative case study we present, took place between 2018 and 2021. Data were derived from document analysis, interviews, and continuous contacts with FÖLI's users. FÖLI was founded in 2014 by six municipalities (i.e., owners) (Turku city, Kaarina city, Naantali city, Raisio city, Lieto, and Rusko) with a total population of around three hundred thousand (300,000) people. Figure 2, below, illustrates the FÖLI region.

Source: www.foli.fi.

With a population of 194 391, Turku is a major city, and the largest in its region. FÖLI's budget is financed by its owner municipalities and strategic subsidies from the Central Government, which are allocated to specific projects.

Data collection was based on a qualitative research methodology with the aim of examining relationships between empirical observations and factors influencing their visibility [7]. The qualitative research design helped to connect the key concepts of archetype theory [9] to a number of major events taking place in FÖLI. These events included the decision to establish a new inter-municipal system for collective transport of passengers by bus and tasking FÖLI to manage it, as well as the management processes and their outcomes.



Fig. 2 The FÖLI region

The first theoretical assumption was that the municipal decisions to establish an inter-municipal, low cost passenger transport system for end-users was motivated by the need to institutionalize an all-inclusive new archetype in this sector. Hence, our leading sub-research questions were “why” and “how”.

The second theoretical assumption was that designing and institutionalizing the new system was costly and time consuming. Our second sub-research questions were: “which actors were chosen to lead the change process?” “which tools and power did the management team of FÖLI receive from the owners of FÖLI?” and “how did the change process remain democratic?”

The third theoretical focus was to investigate whether FÖLI used existing systems and structures, or new ones, and how the change process unfolded.

Finally, the researchers examined the relationships between systems and structures of the new archetype and their continuous interpretative scheme in practice.

Data collection took place between January 2018 and December 2021, starting with an analysis of public data available on FÖLI and its member municipalities’ websites. We soon realised that documentary data reflected more on past, than on ongoing events. Documentary data, covering the period of 2012 to 2021, was collected throughout the duration of this case study. To gain a full picture of the political and managerial contexts in which FÖLI operates, the research team participated in and observed three managerial meetings organized by leading project managers of Turku city during 2018 and 2019. Data from these meetings helped us decide which aspects of FÖLI’s activities are most relevant in analysing the evolution of the new transport system. The research team decided not to include regional transport of passengers by water buses or e-scooters and city-bikes businesses linking bus passengers to/from their homes, because they involve different matters. To obtain more data, the researchers conducted interviews between 2018 and 2021 with the chief executive officer, development manager, FÖLI’s planning manager, two managers of public services, a leading project manager, a chief secretary, a chief environmental manager of Turku city, and five influential elected politicians from different municipalities acting as members of FÖLI’s executive board. Participation and observation of meetings lasted 6,5 h. Interviews lasted 16,75 h in total. Meetings and interviews were conducted in English or Finnish. Meetings notes and interview summaries were documented in English. The data collection methods confirmed each other to be trustworthy [25].

The researchers applied a chronological and thematic approach to analyse the data. The analysis focused on: (1) relationships between the data and theoretical assumptions; and (2) understanding probable rival explanations [35]. Finally, a composite sequence analysis approach was

applied to make sense of the research findings as a whole [25].

4 Findings and discussion

This section has three sub-sections, each reflecting on a specific theoretical assumption mobilised to collect and analyse the data.

4.1 Setting up policies for affordable and accessible collective transport of passengers by bus at inter-municipality level

The main findings in this section indicate that FÖLI’s member municipalities approached the city of Turku in the early 2010s with a request to organize an inter-municipal zone-free system for collective passenger transport by bus at flat rates. The purpose of this system was to attract more people to reside in these municipalities and work locally or elsewhere. Additionally, the system aimed to enable schoolchildren living in different municipalities to attend schools anywhere in the FÖLI region, using a single bus card. Furthermore, the need to promote tourism in the region was supported by collaboration between FÖLI and local businesses, such as hotels, theatres, and sports venues, allowing anyone in the region to travel on FÖLI buses using a check-in ticket from their hotel or tourist event. Leading local politicians displayed a positive attitude to this initiative and actively participated in the planning process. Details were extracted from document analysis of 2012 to 2015, and were confirmed by interviewees.

FÖLI describes itself on its public homepage:

FÖLI offers easy-to-use and smooth collective transport in six municipalities. ...FÖLI is responsible for organizing collective transport in the region and promoting its operating conditions, planning timetables, ticket prices... marketing and passenger information.

The affordability and accessibility of inter-municipal collective transport buses were prioritised during the change process. Accordingly, a zone-free system with a flat price was introduced. The flat price policy included issues related to ticket discounts based on age groups, physical disability, and a free fare for adults travelling with babies. FÖLI’s 2014 official annual financial report provides details:

“The year 2014 was a year of great changes, as the new joint public transportation system, Föli, started operations on July 1, 2014. Turku, Kaarina, Raisio, Naantali, Lieto and Rusko formed a unified collective transport area, where all ticket products, discount groups, age groups etc. are the same. A uniform ticketing system was put into use throughout

the Föli area. Customers received Föli enthusiastically, and Föli received a lot of positive publicity."

Prior to mid-2014, each municipality had its own regulations regarding the collective transportation of passengers by bus. When travelling between municipalities, passengers were required to purchase a regional ticket or a ticket for each individual municipality, resulting in costly regional bus journeys with timetables that were not optimally integrated. The new system requires only one ticket at a flat price. The development manager explained:

Yes, that is our basic thing... we have a flat fare in the whole region... No zones... and no increased ticket price... to a different municipality...

FÖLI's chief executive officer confirmed this and the development manager added:

... the pricing strategy is more... a political issue than a technical one... We want to use a flat fare. That has been one of the greatest things for us... And our customers like it very much because it makes customers' lives so much easier than when we had zones...

Politician A confirmed, commenting:

"... we have always wanted... a flat fare for all passengers throughout the region and we do not want to change it... It is more comfortable... and encourages many to consider using public buses rather than driving their own cars..."

During our interviews, we asked specific questions about how the new FÖLI system improves the accessibility of FÖLI buses for the local population. Politicians and FÖLI's leading managers confirmed that each municipality's power to suggest the number of bus lines and the frequency of each bus was paramount. Additionally, each municipality is responsible for maintaining its public roads and bus stop terminals to improve commuter comfort and safety. The document analysis of FÖLI's board meeting protocols from 2014 to 2020 contained enough quantitative data and qualitative explanations regarding the relationship between each bus line's running hours, driven kilometres, and the total volume of passengers. For example, municipalities seeking to attract more residents to their new residential areas implement a high frequency bus schedule policy and maintain their roads and bus stop terminals throughout the year.

Previous studies analysed the affordability and accessibility of transportation based on income level, transport infrastructures and location [11, 28, 32]. This study's

findings confirm these studies and add that FÖLI's collective bus affordability and accessibility were motivated by a democratic way of life, in which a minimum cost system for all commuters, including similar discount policies that apply to all people in the region, was introduced to improve regional attractiveness and comfort for commuters [5, 12]. Consequently, we argue that the values and beliefs that constitute FÖLI's interpretative scheme as an archetype [9, 17] are substantially oriented towards the affordability and accessibility of commuting by bus within the region.

4.2 Understanding the process of designing and implementing a new collective transport archetype

The main findings in this section indicate that once leading municipal politicians approved initiating an inter-municipal system for collective passenger transport by bus on a zone-free basis and at flat price for all commuters, they requested FÖLI's leading managerial team to implement the decision and provide monthly progress reports. To ensure equal rights and obligations among member municipalities, a regional executive board composed of democratically elected politicians representing each municipality was established. The executive board of FÖLI is composed of democratically elected politicians from each municipality for a four-year term. FÖLI's management team received partial delegation of power to negotiate all relevant contracts with private operators (including outsourcing all services and products needed) in order to implement the change as thoroughly as possible. The partial delegation of power means that FÖLI's managers have the right to suggest operational decisions to the executive board, which then makes the decisions itself. The delegated power includes financial management of costs and revenues of FÖLI's operations and the obligation to allocate to each municipality the costs of bus lines that it has ordered that are not covered by total revenues of that line on annual basis.

FÖLI's board meeting protocols provide enough details about how bus operations and financial management processes take place on monthly basis within the year. All persons interviewed confirmed this. We argue, in consequence, that this finding represents a paradigm shift [33] characterized by municipalities relinquishing a portion of their municipal autonomy in managing their tax revenues, and entrusting them to an inter-municipality executive board that acts almost independently.

FÖLI's chief executive officer explained the operative systems and managerial structures:

...municipalities act as buyers of intra and inter-municipality passenger transport by buses... They pay to us as budgeted... We outsource part of service delivery from local operators through competitive

tendering... Bus ticket income comes to us directly... We pay the bus operators... In case of income surplus, we should pay the surplus back to the municipalities... In case of income deficits, municipalities give additional funding... We are not-for-profit...

The development manager and the planning manager concurred. To operate successfully, FÖLI's leadership had to overcome many challenges. For example, the operational and financial model requests accurate data on the flow, volume, and frequency of passengers, bus schedule, speed, stops, the quality of services, and the accurate allocation of income from bus ticket sales. In consequence, FÖLI purchased software systems capable of quickly collecting and converting big traffic data into quantitative and qualitative performance metrics that managers, bus operators, and political decision makers can easily understand and use. The planning manager explained the basics:

... bus lines that run within one city only, for example, ...internal lines in Turku city, ... Turku pays the costs of those lines with deductions based on ticket incomes produced by those lines... The same principle applies in other municipalities Then there are regional lines... through the whole region.... the cost of each line is divided between municipalities depending on how many people... used that line; ... total driven kilometres and the average speed of the buses...

Dividing costs not covered by bus ticket incomes is further complicated by the number of stops that each bus makes between terminals. The planning manager explained the role and cost-revenue-volume allocations of the online automatic monitoring systems for buses and passengers:

...Suppose a line that costs 500 thousand. Let's say that the bus running time is 30 minutes and there are 20 stops... Then the different intervals per stop will receive a... percentage of the 500 thousand cost. For example, one could be 50 thousand in one interval and then... information on how many passengers have been in the bus and where they were coming from... So we divide that 50 thousand based on that. If 75% of that was from Turku and 25% was from Naantali city, then Naantali city pays 25% of the 50 thousand and so on...

The chief executive officer confirmed, describing the management control systems that FÖLI purchased for accurately allocating inter-municipal costs and revenues to each municipality. These include the online ticketing

system; online bus stops monitoring system; online traffic light system to give green lights to buses; an advanced system to plan and optimize the bus schedule, including indicating bus arrival times at each stop; bus quality control; end-user's online feedback; ticket control apps in buses; and time discipline of bus drivers. These new technologies were designed and implemented to make financial and non-financial performance management as reliable, timely, and successful as possible. The development manager commented:

... It is never easy to design and implement a new system successfully... For example, our online ticket system was purchased in 2014 but became fully operational in 2016... We have had to readjust... continuously... to serve our customers better...

The chief executive officer confirmed and provided another example:

"... before, our customers had to visit our different offices physically... to pay or load their bus tickets or cards... Alternatively, they could do it in buses... Currently, they can do it online themselves... This is more comfortable for them..."

In late 2020, the development manager announced a new feature to the online ticketing system, allowing passengers to pay for their bus cards and tickets using their own credit cards. Consequently, passengers no longer need to carry physical bus cards or tickets while boarding any bus, but simply sets their credit card (or electronic version located in his/her smartphone) to an electronic bus ticket monitor present in each bus before taking their seat. Bus drivers do not check or sell bus tickets or need to have direct contact with passengers. One the researchers used FÖLI's buses during 2021 to analyse how the new ticketing system operates and how well bus passengers have adapted. The researcher's bus journeys confirmed the data collected from interviews.

These findings reveal that FÖLI has implemented technology-intensive systems and structures to deliver greater value. The findings build on previous archetype-based research on public sector organizations by examining how public managers utilise technology-intensive systems and structures to institutionalize a new archetype in the field of collective transport of passengers by bus [14, 20–22].

A practical implication is that municipalities have become more motivated to improve the roads used by buses, and take practical measures to avoid traffic congestion. The development manager explained:

... for example, the city of Turku has had to pay

increased costs of inter-municipality lines because of congestions caused by public activities to build an underground parking at the central market square... Traffic became quite intense and too slow there because of those activities...

An influential politician B, agreed, adding:

... It is clear that time wasted by buses on bus stops... and... traffic jams costs us a lot... That is why we are planning to organize lines that... quickly come to and from the city centre without... many stops ... Passengers will have more opportunities to connect to other buses without coming to the central market for that ...

Politician A concurred. The planning manager added details:

Let us say ... we have municipalities that... are giving the buses priority and are building bus lanes, the buses will start running very fast through the city... and the city will pay less... Because the buses are spending less time on the road and the whole collective transport will be cheaper ...When we can travel faster we don't need that many buses and drivers...

The chief executive officer concurred and explained that the ongoing improvements rely heavily on the technology-intensive systems that FÖLI implemented since 2014. The leading managers at Turku city confirmed this. Hence, in addition to the high professional standards of FÖLI's managers, FÖLI's success depends on a positive political climate and willingness to perform better as a way of improving bus users' comfort at a low cost to the municipalities [15]. Consequently, we argue that implementing an inter-organizational archetype that prioritises affordability and accessibility as key elements of the interpretative scheme, necessitates establishing and aligning specific systems and structures to continuously operate and manage the change process. Our findings contribute to Guzman and Oviedo [11] and Coppola et al. [5] by highlighting the instrumental role of systems and structures that compose an archetype (see Fig. 1) and demonstrating how affordability and accessibility policies that are part of the interpretative scheme of the change shape the change process. The next section presents and analyses the outcome of the change.

4.3 Understanding the pace, sequence and linearity of the change

The key finding in this section is that FÖLI implemented a radical and revolutionary change that institutionalized a new inter-municipal system for collective passenger transport by bus in the region [10]. More specifically, the

radical change resulted from the successful implementation of the flat-price policy (i.e., affordability) and a zone-free territory throughout the region. Each municipality has the power to improve the accessibility of collective buses for its commuters within its budget. From a chronological perspective, Turku city (as the biggest municipality) initiated the change process. Because all municipalities joined FÖLI simultaneously, the affordability and accessibility policy was implemented simultaneously across all municipalities in 2014. FÖLI utilised an open competitive tendering strategy to recruit private bus operators for the new FÖLI region in 2014, with contractual fixed terms of 7 years maximum. Hence, the sequence of change became central [22]. Data from documents analysed and interviews show that all municipalities applied a reorientation linearity to implement the change by shifting from zone-based ticket systems, structures and interpretative schemes to an inter-municipal zone free archetype with flat price schemes for all bus commuters [10]. FÖLI offers a rich amount of open data that explains the intra-organizational change process in each municipality and at FÖLI level and how each operational system and structure became adopted and institutionalized from 2014 to 2020. Data from interviews confirmed the data from documents analysed. The next three sub-sections provide details that explain the outcome of the archetypical process of change systematically.

4.3.1 Radical revolutionary changes

Before 2014, each FÖLI owner municipality had its own bus system. Passengers had to purchase a ticket for each municipal zone before boarding or in the bus. A regional ticket cost was 50% more than a municipal ticket. During 2014, FÖLI was initiated. The first radical change was to introduce a new inter-municipal financing model and to abandon previous municipal models. FÖLI's annual financial report for 2014 stipulates:

...A new financing device was introduced in regional traffic on July 1, 2014. Financing device for internal transport in Turku were changed to new ones during the fall and winter...

Another structural and system radical change was to conclude transport contracts with private operators through a competition process and to task them with operating the newly established inter-municipal bus lines. The 2014 report explains:

... During the year, new traffic and new service contract periods started... Turku Bus Corporation (TLO) started operating regional collective transport on July 1st, 2014 with a total of 40 buses. Of these, 29 were completely new and air-conditioned...

Comparatively, the total number of kilometers and hours driven by FÖLI's buses during 2014 and 2015 was higher than previous years, and the years that followed the revolutionary change, that is, 2016–2020. This means that the new lines' bus schedules were not optimal during the change process, but started to readjust towards the optimal operational level since 2016. Data is provided in Table 1.

Table 1 Key performance metrics of buses based on km, hours, and full days

Year	Total km driven by buses	Total hours	Total full days
2012	11 003 137	559 764	45 561
2013	11 153 777	561 207	45 515
2014	13 561 113	656 677	52 388
2015	16 236 747	757 736	61 313
2016	11 367 085	568 699	44 670
2017	11 481 245	581 371	45 378
2018	11 623 660	587 898	46 086
2019	11 690 899	597 567	45 904
2020	11 355 604	580 824	42 961

Source: FÖLI's annual financial reports: 2012 to 2020

Another revolutionary and radical change in 2014 was introducing a 3-euro discount to each FÖLI customer purchasing a season ticket online rather than from bus offices or terminals. The shift from paper office ticket work to a discounted online approach increased the affordability of collective transport by bus for technologically connected passengers. The 2014 states:

... an online download discount was introduced, i.e. by downloading a season ticket the customer obtained a discount of three euros from the price online... the customer was able to avoid the price increase for season tickets almost entirely. The number of online downloads increased to 18 percent of all bus card downloads in 2014.

We argue that the outcome of FÖLI's new transport systems and structures (new bus lines, new ticketing system, new operators, new customer-focused price policies) and new interpretative scheme (moving from municipality focused collective transport to an all-inclusive regional transport system with zone free tickets) was radical [14] and its pace was revolutionary [9, 22, 27].

4.3.2 The sequence and linearity of change

The study shows that the sequence change was central. For instance, FÖLI focused on changing its central structures, systems, and their interpretative schemes. Peripheral systems, structure, and their interpretative scheme in each municipality ceased to operate. This means that the

change process followed a reorientation linearity [3, 10, 21, 27]. For example, to improve the accessibility of collective buses to commuters, FÖLI initiated and continued to modernize its centralized electronic management control systems since 2014. The 2015 annual financial report explained:

The online charging service was further developed when card payment was added as one of the payment options for customers in March 2015...

To ensure that other ticketing systems (manual) decreased and the new ones started operating, FÖLI introduced an additional electronic ticket system based on QR codes. The new QR tickets allow people to purchase public event tickets (such as festivals and theaters) including the right to use FÖLI buses free of charge. The 2015 report comments:

In October 2015, the use of mobile tickets became even more attractive when QR mobile tickets came into use electronically. The mobile ticket is now displayed to the remote reader as if it is a bus card too. The mobile ticket made possible a new kind of cooperation between event organizers and us.

The 2020 annual financial report provides further information explaining how FÖLI consistently continued to improve the accessibility of its buses to commuters:

"Great reforms were made in FÖLI regardless of the Corona crisis... Example, FÖLI renewed its bus stop schedule. Timetables and other information at bus stops were compiled into one poster with a clear map and also lines and routes from nearby stops... to facilitates visualization... Real-time schedule displays were added in 100 bus stops. Trial period of contactless payment started in December on line 1."

Line 1 is the main bus line that connects Turku airport to the harbour, passing through the city center. The 2020 report provides more details about initiatives made to improve the accessibility of buses to students:

The students started using a new electronic login system, i.e. the Haka login... with which it was no longer necessary for them to go to the service point to prove their right to a student discount.

Hence, the reorientation linearity to improve the accessibility of buses to commuters became possible by using bus ticket technologies allowing passengers to use other types of tickets, such as theater or festival tickets, or even a hotel check-in QR code, Haka login to gain access to

FÖLI buses without purchasing any bus ticket as such. This finding confirms and contributes to previous studies analyzing factors that can improve the accessibility of collective transport infrastructures for commuters [2, 5, 12].

Implementing the policy of affordability for commuters to use FÖLI buses at a flat price followed a consistent reorientation linearity. For example, the price of single tickets, daily tickets, and monthly tickets did not change since 2014 up to the time of conducting this case study in 2020. In this setting, data from 2020 annual financial report shows that the amount of tickets used actively by commuters annually continued to increase since 2015 to 2019 but dropped in 2020 due to the Corona crisis. Table 2 provides a summary:

Table 2 shows that the level of commuting by bus improved in 2017 more than in any other year. This was an immediate positive consequence of improving collective transport infrastructures in urban areas and the accessibility of buses for commuters. The 2017 annual financial report explains:

The year 2017 was a time of strong growth in public transport. The number of trips increased by 5% and FÖLI set a new record for the number of trips – 27 million trips. Positive structural change was visible in the entire urban area and contributed to the need to use collective transport...

It is important to mention that not all FÖLI operated or supervised bus lines attract enough revenue from bus tickets, causing some local politicians to be critical. Specifically, using municipal tax revenues to finance the affordability of underperforming bus lines has raised political criticism [2, 12]. For instance, politician B explained in 2020:

in 2014,... when we designed our regional public passenger transport system... we did not have enough data on how much transport was needed for newly designed areas... all was roughly based on assumptions... We have now realised that some lines are not so much needed...

Politician A, F and C agreed. Politician D explained further:

... Bus lines going to some suburb areas and to some schools are many times half empty or empty...

This causes a concern because we use tax money to finance the costs. However, we are overall happy with how our system performs...

Documentary data confirmed that demand and supply functions of each line at local and regional levels often lack equilibrium. The planning manager explained:

“...we are looking at where our passengers are coming from and how many passengers do we have on some lines... We have a lot of data... from our ticketing system; we know where the passengers are coming from... the new timetables are based on that information...”

Although FÖLI's performance was still beyond question in late 2020, some critical voices continued to push to stop bus lines with insufficient passengers. Politician B explained:

... I do not want to see empty buses... We have to re-organize these... lines because there is a lack of passengers. The situation is not likely to improve ...

The planning manager confirmed in late 2020 that the city in focus decided to stop under-performing bus lines and commented:

“...that is what they wanted and they decided... Now it's up to the collective transport board to decide on how the implementation will take place in January 2021... The board had decided the timetables and the board is the one that has the power to amend all the contracts with private bus operators...”

Document analysis of minutes from FÖLI's board meetings during 2021 confirmed that lines that were downsized had a low level of demand at macro organizational level. This could mean that FÖLI cannot afford to finance the affordable and accessible commuting services for all passengers, irrespective of additional costs, that is, costs that exceed the budgetary limits approved by the FÖLI board in advance before the start of each fiscal year. Consequently, FÖLI's reorientation linearity has evolved to become increasingly cost-sensitive [11]. Table 3 below shows the average evolution of each municipal subsidy per commuting passenger from 2016 to 2020.

Table 3 shows the average municipal subsidy per commuter in each municipality or city from 2016 to 2020.

Table 2 Total amount of trips by FÖLI buses (in 1000s)

Year	2015	2016	2017	2018	2019	2020
Total amount of trips (in 1000s)	24 383	25 724	27 004	26 616	26 271	16 835

Source: FÖLI's annual financial report 2020

Table 3 Average municipal subsidies per bus commuter from 2016 to 2020

<i>Euro/commuter</i>	2016	2017	2018	2019	2020
Turku city	0,8	0,72	0,78	0,8	1,24
Kaarina city	1,07	0,94	0,99	1	1,28
Lieto	1,01	0,91	0,87	1,14	1,58
Naantali city	0,7	0,65	0,72	1,24	1,84
Raisio city	0,79	0,73	0,85	1,05	1,18
Rusko	0,94	0,94	1,1	1,88	2,92

Source FÖLI's annual financial report for 2020

We argue that each subsidy indicates the average cost of affordability and accessibility per commuter financed by municipal or city taxpayers. It is clear that municipalities that have fewer commuters (see: Kaarina, Lieto and Rusko) pay slightly higher costs of affordability than other municipalities. Bus ticket subsidies for 2020 became much higher than in previous years due to Covid-19, leading to a sharp decrease in bus commuters in the whole region. This finding contributes to earlier studies in this field [4, 19, 24] and adds information related to cost per commuter financed by taxpayers.

5 Conclusion

The aim of this study was to explore how a group of municipalities implemented inter-organizational changes that improved the accessibility and affordability of commuting by bus in the so-called FÖLI region. The research question was, how does a collective transport organization become effective in organizing accessible inter-municipal carriage of passengers by bus at an affordable cost for commuters? The theoretical part applies archetype concepts, using accessibility and affordability as pillars of the interpretative scheme in the change process. Data were obtained from a case study conducted in FÖLI, an inter-municipal not-for-profit organization responsible for organising and coordinating local and regional collective transport of passengers by bus and water bus. The water sector was excluded from the dataset.

Research findings show that FÖLI implemented a radical revolutionary change by introducing a new framework for the carriage of passengers by bus at regional level with a zone-free and flat ticket policy, effective since mid 2014. The change quickly became successful by abrogating zone-based bus ticket systems and structures (including prices) and institutionalizing a zone-free system with a flat price approach for all commuters in the region. The sequence of change was central, that is, FÖLI institutionalized centralised management control systems that rely heavily on technology-intensive applications. The linearity of change followed reorientation tactics. The process of planning and approving FÖLI's costs and revenues is democratic at the inter-municipal level.

However, daily operational management is in the hands of highly experienced professionals. Over time, funding underperforming bus lines for the sake of accessibility and affordability invoked criticism at municipal levels. Leading politicians settled the matter democratically towards the end of 2020. The success of FÖLI is widely recognized at national and international levels.

This study contributes to the literature on archetype theory by examining the relevance of accessibility and affordability in the configuration process of designing and implementing change, and extending knowledge in this area. Specifically, for the first time, our research shows the way in which FÖLI used the accessibility and affordability policy as an interpretative scheme to design and implement the change process successfully. Moreover, the paper makes an empirical contribution by utilising data from FÖLI to examine how the archetype analysed reduced commuting costs funded by municipal tax revenues. One of the key successes of the FÖLI region is the inclusion of end-users voices in designing, implementing, and financing collective transport policy change, with end-users' comfort as a priority.

The findings of this study do not claim empirical generalization. However, its theoretical approach merits further application in other organizational settings. The role of competitive tendering policies in improving financial, social, and environmental sustainability in the FÖLI region warrants further research elsewhere.

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Authors' contributions

All authors contributed equally to the paper.

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Data Availability

Quantitative data are available from FÖLI's archives. Qualitative data, i.e., transcripts of interviews and meetings are in the archives of the corresponding author.

Declarations

Competing interests

Not competing interest.

Disclaimer

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