



Lady cycling on velopass on the Lake Geneva shore on a summer day

Evaluating the potential for intercity travel combining public transport and active modes: The velopass bike sharing system.

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Abstract

Over the last decade quite a few European agglomerations have adopted free access bike sharing systems with an unexpectedly large success. However, these systems remain confined within each city's own territory, and as they are not compatible with each other, they largely bypass the potential synergies that could emerge from developing a fully-fledged intercity multimodal travel offer. In Switzerland, the new Velopass bike sharing system currently being implemented wants to innovate in this respect by proposing a highly compatible system at the national scale, where users will be able, through the use of one single card, to borrow a bike in any city of their choosing. Such a flexible system opens up new possibilities for intercity travel combining sustainable modes, in particular through the intermodal sequence "bike at origin – public transport - bike at destination". By ensuring the availability of a fast, reliable and sustainable mode that allows door-to-door seamless travel while prolonging the public transport's radius of influence, shared bikes enhance the attractiveness of public transport travel between cities, which is crucial in facilitating mobility within the swiss Central Plateau extending from Zurich to both Geneva and Basle, which already benefits from a very extensive public transport coverage.

Thus there is an interest in following this experience up closely in order to evaluate its added value for the wealthy development of intercity dynamics, and thus gather lessons to learn for similar heavily urbanized regions throughout the world that are heavily dependent on intercity network connections to thrive, both economically and socially. Indeed within the present context of the fast increase of high-speed connections between cities, there is a rising interest in deploying a good level of service in accessing public transport interfaces from home and office, all the more so when these are located in different cities and not especially close to these interfaces. Intercity bike sharing may thus become in the future an appealing solution for urbanised regions that privilege interconnectedness in order to be able to function as single large-scale agglomerations.

This study evaluates the conditions for deploying the Velopass system, enabling and hindering factors that shape the process (including its governance and relationships between the different stakeholders), how the system is perceived by the users and the ways in which introducing such a system can affect travel behaviour and provoke shifts in modal share trends. It will also attempt to infer potential optimizations that increase the efficiency of the overall network.

Keywords

Cycling – bike sharing – multimodality – public transport – car sharing – combined modes – trip-chaining – smartphone applications – RFID – intercity travel

1. The rapid growth of bike sharing in Europe and throughout the world

Most agglomerations in Europe and throughout the world are striving to achieve sustainable mobility goals. One of these goals is to increase the use of active modes (namely walking and cycling), for health, safety and environment-related reasons. In what respects to cycling, cities thus face the issue of making the urban environment safer and more attractive to cyclists, but also the challenge of bringing on occasional users which do not use bikes as their main mode of travel, but rather weave it within the chain of diverse modes that best suits their needs. Traditionally cities addressed the first of these issues while largely ignoring the second: thus, in spite of municipalities' best efforts throughout the nineties in increasing the offer in adapted infrastructure (through increasing the number of cycle lanes and paths, the number of bike-dedicated parkings and, albeit rather timidly, the possibilities of transporting the bicycle in public transport), cycling modal shares remained modest or increased only slightly. However, the introduction in 2004 of Vélo'v, a free access bike sharing system in Lyon, and the subsequent increasing number of cities that followed suit, has introduced dramatic change in the uptake of cycling as a mode for daily transport, allowing occasional users to bike ride when and where they wanted, without all the hassle of owning one. Intermodality, thus, is key to the upscale of the system. Thus from 2004 on, bike sharing systems have been on the rise in Europe and around the world. New markets are constantly being invested by the main operators, as more and more cities want to join the club of cycle-friendly cities. But all of the actors involved, and bike sharing as a whole, would benefit all the more from a change of scale switching from single-city networks to clustered-cities networks at a regional or a national scale, such as Velopass, the one being now launched in Switzerland. In the next sections of this paper we shall investigate the reasons for its success and what lessons can be learned from the Swiss experience in order to deploy similar large-scale clustered-cities systems in other European contexts and elsewhere in the world in contexts where a dense network of intercity travel connections already exists or is being fabricated today.

2. Factors of success driving bike-sharing growth

2.1 Simplicity and flexibility at the heart of an user-friendly system

This service, which prides itself in being eco-friendly, effective and healthy, addresses to commuters, tourists, students and regular inhabitants alike. The bikes can be borrowed at any time, 24 hours a day, seven days a week, and can be returned to any station belonging to the system, which gives great flexibility to cover ground independently of territorial boundary and other institutional constraints. Here it's the functionality of the life basin that counts. Time-wise, flexibility is also privileged with the different types of access proposed: the first half hour for free, then 1 CHF per hour has been adopted, as it has become standard practice elsewhere. The novelty lies in the annual pass that can be bought for a single network or to cover the whole cluster of networks at national level. Day passes are also available for the occasional user or the tourist wanting to take advantage of the system for only a short while.

The secret of the overwhelming success of most urban bike sharing systems lies in the fact they address - quite well in fact, both in its reach and scope - daily mobility needs, and are not targeted mainly for tourism or leisure uses, as previous traditional human-manned bicycle rental systems. As the spicycles website puts it: « Bike Sharing Systems in urban areas usually differ from traditional bicycle rental services since they are rather offers for daily mobility than leisure oriented systems. In contrast to those conventional renting schemes, Bike-Sharing Systems can be used one-way for either monomodal or intermodal trips. As a flexible mobility option they can be considered as additional part of public transport systems. »¹. Most bike sharing systems as we now know them are targeted for short-term use, in that the first half-hour is usually free of charge, while the pricing climbs steeply after the first hour or so. These systems are thus meant for indigenous uses, either for commuting or more occasional motives such as shopping, rather than for tourists. Velopass, with its double-oriented pricing system, goes a step further and accommodates both types of regular and occasional uses and both indigenous and tourist publics.

2.2 RFID technology enhances multimodal behaviour

In regards to multimodality, most cities that have introduced bike sharing systems have agreements with public transport operators that allow for including bike access for a small

¹ <http://spicycles.velo.info/Earlydocuments/Themes/BikeSharing/tabid/92/Default.aspx>

extra fee within monthly and yearly public transport passes. In Switzerland, Velopass has taken advantage of the high level of flexibility offered by RFID to widen their range of action by striking agreements with a growing number of partners whose scope of action goes largely beyond public transport. Thanks to RFID technology, the same card allows easy access throughout the whole territory and makes it easy for new cities or enterprises to join in. As information and rights of access become instantly easy to update, adding new stations to the network at any given moment is perceived by the users as an immediate gain. Rather than through a dedicated card, it is also possible to grant access to the system by embedding Velopass in other RFID-based cards, such as enterprise badges and public transport passes. In addition to being compatible with public transport agglomeration travel passes such as Mobilis in Lausanne, this system is all the more interesting because of being compatible with Mobility, the Swiss car-sharing system. Thus members of the car-sharing network are instantly able to use this new service with their existing Mobility membership card. This allows people with an inclination for adopting shared modes more leverage to shed their own cars in favour of a fully-fledged multimodal behaviour. Both systems have special deals with the rail yearly passes as well. Such an integrated system thus allows for taking the train between cities and then change for a car or a bike at destination. Soon, may one hope with the dissemination of this technology, as it now only depends of the extension of agreements between different service providers, it will be possible to combine within a single card access to money (credit card and cash withdrawal) and to all kinds of mobility (public transport, car and bike). As Jeremy Rifkin has shown with his book *The age of access*, therein lies one of the main keys to the current shift in our philosophical stance from a culture of possession into a culture of sharing.

2.3 Ubiquitous availability and key access nodes into the network facilitate trip chaining

The main challenge of course, when talking about intermodality, lies with an easy, user-friendly way to change modes. The location of bike stations near intermodal interfaces is a key prerequisite in order to increase intermodality. Getting out of your car, the bus, the tram or the train and hop onto a bike must be a breeze. Nothing other than seamless and hassle-free transfer will do. Key points are availability (the high degree of coverage of the system both in time and space) and accessibility (ways of overcoming the main barriers of entry to newcomers to the system, namely facilitating its understanding and easy start even without being familiar with the how-to's).

Bike sharing really took off when availability ceased to be an issue. In recent bike sharing systems, the scale of deployment is simply staggering, and the single largest factor of success: bikes are available in large numbers and disseminated throughout the whole territory, and

they can be used 24h/24, 7 days a week. No direct human interaction is required, and the bike can be returned to any station within the network. This gives total satisfaction to the needs of the user. The ubiquitous wish of “A bike whenever and wherever I want it” is fulfilled, provided refilling of the stations is regularly ensured through appropriate logistics. Furthermore, having clearly defined stations addresses issues such as visibility, security and parking.

Accessibility to the system, however, must also be eased if the system is to be adhered to massively. Most bike sharing systems are conceived to make borrowing a bike something akin to child’s play. Putting the bike back into place is just as easy and the whole operation usually takes less than a minute. The problem lies more with the first steps to become a member of the system. Inscription is compulsory and though pricing rates are usually, designed to guarantee access to all, in practice the current methods of payment (through debit or credit card mostly, either over the internet or at the stations themselves) may cause potentials users to refrain from adhering to the system. Velopass, as some other systems, also sells passes in commerce venues close to the stations, especially handy for the occasional user. In the future, payment systems shall most probably evolve to mobile-based applications, with the advantage of covering a larger share of the population, namely young people who do not usually possess a credit card.

3. Bike sharing in Switzerland: from local human-manned systems to a full-fledged self-service network at national level

3.1 A favourable context to expand throughout the whole territory

Switzerland benefits from an excellent public transport system, be it at the local, regional or national levels, and this feature is crucial in facilitating the widespread use of combined bike and rail commuting. Good services with many lines and stops, dense and regular scheduling, and friendliness towards bike users, namely through dedicated space for bikes in trains and postal buses, as well as some urban trams, metros and buses, and increasingly dedicated parking space and velostations at most train stations, allow smooth transfers and *à la carte* combining and enhance the natural complementarities between the short and long distance modes.

Though there have been some losses in the regional train networks, on the whole Switzerland remains very well connected by public transport, in the lowlands of the central plateau where the main agglomerations are clustered, but also high up in the mountains, be it through regional trains, intercity trains, postal buses or urban public transport networks. Most recent improvements regarding rail connections, provided through the Rail 2000 program, focused on long distance connections, doubling frequencies to the half-hour throughout the whole country and bringing major cities closer together by shortening travel time. At the same time RER networks do develop, albeit gradually, and frequencies tend to increase there as well to 2 or sometimes 4 times per hour. Cadenced scheduling was introduced throughout most of the rail network, including a certain number of correspondences with regional trains and postal buses. As a general rule of thumb correspondences were improved and transfer delays shortened.

As in other European cities, there has been a recent revival of the tram and metro in cities such as Geneva and Lausanne in particular. The other main cities, Basel, Bern and Zurich benefited from the chance of not having dismantled their tram network in the 60s', and built on their existing networks to reinforce their tram offer, which is now quite extensive. These last three cities also benefit from an extensive, bike-friendly regional rail network that contributes greatly to their high shares of cyclists intertwining biking with train commuting. In these agglomerations, cycling trips are already superior to car trips, and the trend is shifting towards a steady increase of cycling trips. Doubtless Velopass will greatly contribute to a further rise in this trend in agglomerations, though it might not yet show in the 2010 figures of the next transport microcensus, since the system is still being deployed. Figures of the 2015

microcensus, on the other hand, will probably be able to show this evolution with a more adequate perspective, given the fact that the system will probably reach its full maturity by then.

Parallel to its extensive rail network, Switzerland also benefits from an extensive and well-maintained network of trails crisscrossing the whole country dedicated active modes, further enhanced by a 10-year nationwide effort that gave recently birth to the Swissmobile project that gives citizens an overview, via their website and dedicated maps and brochures, of the wide range of possibilities of combining walking and cycling with all forms of public transport to traverse the country for leisure purposes. National and regional cycling routes are legion, traversing beautiful landscapes across country and lakesides as well as agglomerations, interweaving the whole territory into a single meaningful construct perceived as very cycle-friendly. Dedicated lanes have sprouted on nearly every major road linking localities and throughout most agglomerations, and shared spaces and general speed reductions have created a general climate that favours the practice of cycling both for leisure and everyday purposes.

3.2 Velopass: a major scale upswinging

Prior to the launch of Velopass, a few cities had already possessed for several years a human-manned bike rental system, aptly named after the city's name and the suffix "roule", meaning "to ride" in French. This first generation of bike sharing gathered 8 independent networks: Genèveroule, Lausanneroule, Valaisroule, Neuchâtelroule, Bernrollt, Zürirollt, as well as Yverdon and Fribourg. The procedure was simple: one could rent a bike, either for free or for a small fee, for an hour, an afternoon or a full day, against an ID card and a deposit sum. Associations employing people in a process of social insertion were in charge of operations, and this feature was an interesting part of the process, but the human-manned system had its drawbacks: stations were few and far between, opening hours were relatively short or revealed themselves as inconvenient regarding potential uses, the renting procedure was more time-consuming, and the offer was seasonal, available only during the summer months. Most users thus were tourists or people using the bikes for leisure purposes.

Only with the new self-service system, benefitting from a wide number of stations covering a city's most strategic spots and offering a round the clock access, has bike sharing been able to lift off to new heights and reach a wide public of potential users that use the system to a variety of new uses besides leisure, such as commuting, shopping or transport to going places they want to go.

The advantages of the new system over the previous one are significant, both for the end user and for the operations management team. The user gets a much simplified and uniform

service that is available to him throughout the country, using the same card anytime he wants for any station in any network of his choosing. The commodity is high, all the more so as it is gained for a very reasonable, and again, a uniform price. But other barriers of entry are overcome which are even more important than price, such as the payment mode, the management of one's own account through a dedicated platform allowing one to keep track of past trips and costs, and access to other mobility means such as public transport and car sharing with the same single card. The operations management team also gets large benefits from this single unified system, as opposed to the dispersed local teams previously in charge of operations in each city. In assuming the national coordination of the system while leaving the decentralized day-to-day management to the local associations already in place, now in charge of maintenance and shuffling bikes between stations, Velopass benefits from a centralized backoffice and callcenter services, a dedicated platform taking stock of all the stations and all the bikes in real-time and allowing for a better-fitted network management and cycle maintenance, communication and publicity campaigns leveraged at national scale. Economies of scale and synergies in system management mean substantial reductions in cost.

The new generation fully automated Velopass bike sharing system has been launched in the early summer of 2009 in the Arc Lémanique region, linking Morges to Lausanne and the French Riviera (Vevey, Montreux). 14 stations have opened in the first batch, boasting 165 bikes. From the beginning, the system has met remarkable public adhesion, with figures as high as 11'213 bike trips in the Lausanne-Morges network and an additional 1'522 trips in the Riviera network for the first six months in operation. These early successes have been quickly followed in 2010 by the opening of 3 new agglomeration networks, Yverdon, Fribourg and Lugano, and these in turn have fuelled rapid growth of the system, with several other networks due to open in other cities in the years to come: the Wallis region and the city of Basel are foreseen as the next steps by the end of 2010, pushing the total up to 48 stations and 632 bikes, with the long-term goal of plugging the whole of Switzerland into the system.

Achieving a growth ratio of a factor 6 in its first year is proof enough of the enormous enthusiasm Velopass has encountered throughout the country. And yet, it is only the beginning indeed, since the potential for growth is still huge, as most of the twenty or so largest Swiss agglomerations are yet to be affiliated to the system. Synergies between stations that have been equipped are still falling into place as people learn of the system and take on new mobility patterns using this mode, either by itself or combined with other modes. Velopass figures for the first year show a steady increase in both the number of users and the number of trips, as has also been observed in many prior bike sharing experiences in other cities in Europe. It is still a bit early to draw conclusions regarding the impact of access, via the same RFID card, to other mobility schemes such as Mobility Car Sharing or Mobilis, and the impact of being able to use several networks with the same pass. Most passes that are sold for the moment are regional passes, but the national pass price is not deterring, and combined

with the rail general pass, the offer will definitely start to get very appealing when the entrance of more cities does expand the network beyond a critical threshold where it really becomes advantageous to buy the national pass over the regional ones. Taking into account the fact that Switzerland railway system is one of most heavily used in the world, and the fact Swiss people travel a lot within the country both for leisure and for work-related trips, and given the widespread possession of half-price and general passes throughout the population, it won't be long until most of those willing to use a shared bike will also acquire a pass that allows them to use Velopass throughout the country in conjunction with their rail passes.

4. Conclusions and insights on the potential of deployment at the European level

As we've seen, there has been an enormous exponential growth in urban bike sharing systems throughout the world in the past few years, including in emerging countries. This trend will quite probably keep up its pace in the near future as actors in the market professionalize themselves and strive to gain market shares and more and more cities are equipped as a consequence of the enthusiasm the public shows regarding taking up bike sharing into their daily mobility patterns. The earlier successes of cities such as Lyon and Paris, but also Montréal, show other cities it is not only doable, but politically beneficial and a great means to change and reinforce a city's image.

Beyond the value of bike sharing in and of itself, in this article we focused on showing its added value for multimodal dynamics both within an agglomeration and for intercity travel, when brought in conjunction with public transport, namely rail, and other shared modes, such as car sharing.

The Swiss case described in this paper is only a showcase demonstration for the larger case that we are trying to demonstrate here. As cities, especially within the European context, but also in Asia, are closely knit together by high speed train networks which are due to be reinforced in the upcoming years, we feel there is great untapped potential for intercity travel combining bike sharing, both at the origin and at destination, with travel by rail between cities belonging to the same cluster economy or between different parts of the same agglomeration connected by RER. Commuting is of course one of the main motives for adopting this type of mobility, but tourism and leisure, as well as the potential for modal transfer regarding short trips (less than 5 km) for shopping and other reasons to go places all provide a host of complementary potential uses that encourage the development of such integrated systems.

However, we must underline that deploying a bike sharing system at a regional or national level involving a cluster of several cities is not just a jump in size from what it would be regarding its deployment in a single city; it affects the very nature of the network itself, and the way it must be built in order to facilitate the new relationships that are to be fostered from the complex trip-chaining necessarily involving rail (or other public transport modes adapted to regional-scale travelling) and cycling. Indeed, most shared bike trips in single-city systems are short, both time and space-wise, and monomodal in nature. The shared bike is mainly used as an alternative to the car, public transport or walking, not as a complement to these other modes within the same trip sequence. Not so with clustered-cities systems, that by definition involve complex trip chaining within the same trip of the type we've been describing throughout this article as bike at origin – rail/PT – bike at destination. In this case it is quite

essential, when planning the network for bike sharing, to provide good multimodal connections by locating bike sharing stations adjacent to public transport interfaces such as rail stations and major urban hubs, as well within easy reach of facilities that allow a smooth transition from other individual modes, such as P+R and car sharing stations. Such a targeted development of the network would in our view better address the needs of multimodal travellers and encourage a swifter change towards the use of shared modes within an urban environment and more sustainable mobility behaviour.

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