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Annexure B – Long Case Study - Promoting bicycle use with BSS: Lyon and other cities
Module 6: Climate Change and Urban Mobility

A. Project Overview

1. **Name.** Promoting Bicycle Use with Bicycle System Sharing (BSS): Lyon and other cities.

2. **Location**. Starting point of the case study: Velo'v in Lyon, France. Other examples will be given.

3. **Focus**. Diminish car use in center of cities and lower gas emissions (local pollution and CO2 eq.) while augmenting quality of urban life.

4. **Partners.** In the case of Lyon the primary stakeholders are the City of Lyon, responsible of cycle-paths infrastructure and the publicity firm JCDecaux responsible of operating the BSS. The partners may vary in other cities.

5. **Climatic zone/geo-physical context**. In which eco-system/geo-physical context is the good practice operating? You can tick more than one box.
   - Temperate √
   - River basin √

6. **Weather patterns and resulting vulnerabilities**.
   The climate of Lyon is Mediterranean with no extremes of temperature. The promotion of Bike use and BSS is applicable in various climate contexts.

7. **Stage.** What is the current stage of the practice?
   - ☐ Fully operational in Lyon √

8. **Scale.** At what scale is the practice operating? You can tick more than one box.
   - ☐ City √
   - ☐ Sub-district √
   - ☐ Community/ neighbourhood √

9. **Duration**. Will vary in function of the operator (public or private). In Lyon the time frame of JCDecaux operator is 8 years.

10. **Summary**.

    Wikipedia (www) gives a good summary of BSS:

    "A **bicycle sharing system**, also known as **bike-sharing**, is a service in which bicycles are made available for shared use to individuals who do not own them. Bicycle sharing systems can be divided into two general categories: "Community Bike programs" organized mostly by local community groups or non-profit organizations; and "Smart Bike programs" implemented by government agencies, sometimes in a public-private partnership. The central concept of these systems is to provide free or affordable access to bicycles for short-distance trips in an urban area as an alternative to motorized public transport or private vehicles, thereby reducing traffic congestion, noise, and air pollution. Bicycle sharing systems have also been cited as a way to solve the "last mile" problem and connect users to public transit networks.

    Public bike sharing programs address some of the primary disadvantages to bicycle ownership, including loss from theft or vandalism, lack of parking or storage, and maintenance requirements. However, by limiting the number of places where bicycles can be rented or returned, the service itself essentially becomes a form of public transit, and has therefore been criticized as less convenient than a privately-owned bicycle capable of point-to-point transport. Government-run bicycle sharing programs can also prove costly to the public unless subsidized by commercial interests, typically in the form of advertising on stations or the bicycles themselves.

    Bike-sharing systems have undergone changes that can be categorized into three key

phases, or generations. These include the first generation, called white bikes (or free bikes); the second generation of coin-deposit systems; and the third generation, or information technology (IT) based systems. Recent technological and operational improvements are also paving the way for a fourth generation, known as the demand-responsive, multimodal system.

As of May 2011 there were around 136 bike-sharing programs in 165 cities around the world, made of an estimated fleet of 237,000 bicycles. Launched in 2008, the Hangzhou Public Bicycle program in China is the largest bicycle sharing system in the world, with around 61,000 bicycles and over 2,400 stations; and it is followed by the Vélib' in Paris, which encompasses around 20,000 bicycles and 1,450 bicycle stations. The countries with the most systems are France (29), Spain (25), China (19), Italy (19), and Germany (5).[1]"(Wikipedia).

Velo'v in Lyon

Velo'v was launched in Lyon, France in May 2005. Velo'v innovated by introducing more sophisticated "smart" technology to reduce losses from theft, user damage, and vandalism. "Considered to be a city less than friendly to cyclists prior to 2005, the *Velo'v* programme is credited with stimulating an increase of 500% in bicycle trips within the city, a quarter of which were due to the bike sharing system. *Velo'v* introduced a number of innovations that were later copied by Paris's Vélib' and most other municipal bike-sharing programmes, including the use of electronic locks, smart cards, telecommunication systems, and onboard computers." (Wikipedia).

In Lyon, the infrastructure of cycle paths is the responsibility of the city and the BSS system is operated by the publicity firm JCDecaux without charge to the city, the system being financed by tariffs and a concession of publicity in the city. The tendered contract is of 8 years. The firm JCDecaux operates other systems copied on the Lyon example as in Paris (July 15, 2007) which is the second largest BSS system in the world with 2000 bikes and in Sevilla, Spain (SEVICI, summer 2007).

The system is available in the central parts of the city (Lyon and Villurbane) with 4,000 bicycles and 340 stations spread across the central parts of the city (at every 300 meters, approx.). Various formulas are available to sign-up (http://www.velov.grandlyon.com): a pass for a day, a week, a year. Once signed up you can hire a bicycle at any Vélo'v station, 24 hours a day, 7 days a week. Provided you are aged 14 or over, be physically able to ride a bike and have public liability insurance, all you need is a long-term subscription or a short-term ticket. The first 30 minutes is free, then you may return the bike, and after a short pause take another bike. If you use the bike for more than 30 minutes, there is an additional cost, which rises exponentially with the extension of the period. For a long term user: 0.75 euros for the first additional half hour and 1,50 euros for the 2dn half hour and for the short-term ticket: 1 euro for the first additional half-hour and 2 euros for the 2nd half hour. The purpose of this pricing is to have a maximum number of bikes available. The operators have a system of

redistribution of bikes in various stations to insure a minimum supply of bikes since there are always more bikes in stations downhill than uphill.

The annual subscription offers 3 options: classic for 25 euros a year; 14-25 years old for 15 euros and RSA (Active Solidarity Revenue – for poorer persons) of 15 euros a year. The short-term subscription offers 2 options: 1-day ticket of 1.5 euros or 7-day ticket of 5 euros.

The Velo'v was a success locally and probably it's main success was that it was imitated in various cities: Paris with Velib' introduced in 2007, and BIXI in introduced in 2008 in Montreal, which then sold the system to: London (U.K.), Melbourne, Ottawa, New York, Toronto, and others.

To be successful the system must be fully implemented and be a real alternative mode of transportation promoting intermodality with public transit. Its impact on reduction of CO2 emissions can be substantial and rapid.

B. Detailed project information

Challenge

11. **Issue.** Introduction of a new BSS service in a mid-sized northern city where the use of the bike had been almost completely lost with a modal share of only 0.75% of total trips in 1995. The population of Grand Lyon was 1.3 million in 2001 and the Central part, Lyon (500,000) and Villeurbane (124,000).

12. **Affected group(s).** Affects all mobility patterns. The cyclists, of course but also the pedestrians, car drivers, taxi drivers and public transit since space for car usage was reduced to make cycle paths.

13. **Impact.** Enormous positive impact on the quality of life of the Central City. In only a few months the modal share increased 150% and a few years later by (500%).

Overview

14. **Design.** Stations equipped with bicycles for the BSS were made available in the central part of the Lyon Urban Area (Lyon and Villeurbane), each at a walking distance equivalent to bus stations (around 300 meters). The system is available 24hrs, 7 days a week to subscribers.

15. **Selection.** Other formulas are possible to promote bike use: lend a bicycle free over a long period; have days promoting the use of bikes closing the use of cars on Sundays ; etc. Also, BSS systems may have different financing formulas: in Lyon and Paris (JC-Decaux by publicity profits); in Barcelona by Parking profits; etc….

    The system of Velo'v was introduced to have a more permanent, accessible to all, system of bike use that facilitates intermodality (bike – transit – bike) for short and long urban trips.

16. **Pro-poor.** The subsidized tariffs benefit to all, especially students and poorer people who enjoy lower tariffs.

17. **Impact.** As said above, enormous positive impact on the urban quality of life and strong rise in the use of the bicycle.

Stakeholders

18. **Who were the main stakeholders in the practice and what were their roles?** Please provide a short summary of key stakeholders: their principal activities/responsibilities/role and what impact their input had (or didn't) in each stage of the project.

    a) Name of organization: Grand Lyon_
    Type of organization: Municipality_

    Role of organization: Responsible of the general mobility plan _

    Brief description: Grand Lyon or Communauté Urbaine d Lyon is quite progressive in Public Transport facilities_(Metro, Tram, Bus, Cycle Paths, BSS).

    b) Name of organization: Jc-Decaux
    Type of organization: Private__

    Role of organization: Publicity Firm__

    Brief description: Total responsibility of operation the BSS system on a contract basis of 8 years (tendered). Has a contract of exclusivity of publicity in public places, which provides financing to the BSS. _

The Grand Lyon has the responsibility of Planning Transportation Routes and infrastructure.

JCDecaux has the responsibility at its own cost, financed by an exclusive contract of Urban Publicity, to operate the system for a period of 8 years starting in 2005. Installation of bike stations, purchase of bikes, maintenance, redistribution of bikes among different stations to equilibrate supply and demand.

19. **Cooperation**. We do not have precise information on this point. However, meetings with planners of Grand Lyon and responsibles of JCDecaux in Lyon showed a spirit of public-private collaboration, probably a positive factor of the success of the operation.

Actions

20. **Initiation.** Was initiated in May 2005.

21. **Planning and design.** Planning linked to the general urban mobility plan. The main objective is to reduce car use in the central parts of the city and give more space to cyclists and pedestrians. A new vision of the city.

22. **Implementation.** The first phase of implementation was rapid, an essential condition to make the operation a success: 3,000 bicycles and 250 stations were rapidly implemented. The actual capacity is of 4,000 bicycles and 350 stations.

23. **Operation and maintenance.** JCDecaux has full responsibility of operating the system. A high cost is the purchase of the bicycles. Certain cities like Paris with a similar system had serious problems of theft of bikes. Cost of maintenance of bikes is also high. Redistribution of bicycles among stations is another cost. In Northern cities with snow, the whole system has to be removed in November and reinstalled in April. The BIXI system (copy of the Lyon and Paris systems) adopted by Montreal was improved by making it Wi-Fi, which facilitates installation/removal of stations.

24. **Monitoring and evaluation.** Little information available. Sometimes web sites give global results of operation (number of bikes, of stations, clients) but full data on operations are not readily available.

25. **Timeline.** In the case of Lyon, contract of 8 years, then, another bidding is required. May disappear if JCDecaux does not win the bidding. Considering its success, it should

continue with JCDecaux or another operator. The main competitor is also a publicity company, Clear Channel.

Funding

26. **Source.** Cycle paths infrastructure paid by the Urban Community. All operation costs paid by the contracting firm JCDecaux with profits from exclusivity of publicity in the Urban Area.

27. **Management.** It is financially sustainable with the benefits from publicity. Otherwise, the tariffs are not sufficient to finance the operation, especially when the tariffs are low for social reasons. However, overall, a cost-benefit analysis would give very high social return. In the literature we read that an investment in bike use of 1$ will give a social global benefit of $3 or more. In a city like Puebla, Mexico, where tourism is important,

Results

28. **Effectiveness and efficiency**.
    Only 6 months after the implementation of the Velo'v in Lyon, there were 1 500 users: 86% were residents of the Central Area (Lyon and Villeurbane) and 64% of the trips were for commuting (home-work). 75 % of the cyclists are men. The intermodality observed (bike other modes) was of 1.75% of the trips compared to 0.6% in 1998. We will need further Household OD surveys to see the actual situation.

    Such measures benefit to the whole population, mainly by reducing car use in the central city and reducing pollution.

    In certain cities like Velib'in Paris, measures diminishing car use and parking car space had a "perverse " impact of increasing considerably use of motorbikes mainly for their facility to park.

29. **Stakeholder satisfaction**. No direct information on this aspect except information on the web site that shows the operation as a success.

C. Looking to the future

Lessons learned. A good policy can work and can work fast. For a BSS system certain conditions must be met: have a sufficient number of bikes, implement the system rapidly.

To be successful, the system must be a real transport alternative. The example of Velo'v in Lyon illustrates it. As well as the similar experience of Velo'v in Paris, and the BIXI system in Montreal, sold to various other cities with success.

30. **Sustainability.** Diminishing car use in the city, with the actual technology, is a must to attain sustainability.

31. **Replication.** As said above the replication of the system was quite spectacular in European cities as well as in Canada and USA. It is also expanding in Latin American with a surprising rapidity.

32. **Scaling.** Scaling up the practice would be possible if accompanied by TDM (Travel Demand Measures) to reduce car use (higher taxes on tax use, higher parking fares, reserved lanes for public transit, etc.). In such a case bike use at least for short trips (roughly half of all urban trips) would be a good alternative.

D. Additional information

33. **Other important information.** Important information on bike use in various cities is crucial. What would be a reasonable target? For example, a modal share from 1 or 2 % of total trips to how much? 4%? 8%, 12% or more?

A FEW EXAMPLES

City	Pop. City	Pob. Urban Area	km cylepaths total	Parking for bikes	Modal share bikes	Cost infrastrucure/km (US$)	Cost maintenance/km (US$)	Estimate of C/B	Remarks	
Bogóta 2011	x	8.3M	366			147,000	24,400			
México D.F. 2012	8.9M	18M	25						projected 300km	
Guadalajara	1.6M	4.4	65						BSS Bikla Public	400,000 users every Sunday
Buenos Aires 2012	2.9M	12.8	100						Mejor en Bici	70km separate cylepaths constructed
Sydney, Aus. 2010	x	4.4M	294					3.88	Projected	
Stockholm	830,000	2M	760km		7%				Rent a bike	
Munich	1.3M	x	200	17,920 (8,000 projected)	1997: 13%; objective 15-20%				Call a bike	
Lyon	445,000	1.2M	400		3%				Vélo´V	
Paris	2M	12M	371 (2020: 800km)		3% - Objective 8%				Vélib'	
Barcelona	1.6M	5.3M	800							
Strasbourg	277,000	885,000	476		8%				10 parkings bici/ 1000hab	
Amsterdam	783,000	2.2M	400		30%					
Copenhagen	1.2M	2.4M	370		36%					

City	walking	cycling	public transport	private motor vehicle	year
Copenhagen	6%	36%	29%	26%	2004
Aarhus	7%	27%	19%	43%	2004
Eindhoven	3%	24%	8%	65%	2004
Malmö	6%	24%	18%	51%	2004
Amsterdam	4%	22%	30%	44%	2004
The Hague	5%	22%	30%	43%	2004
Utrecht	3%	21%	25%	51%	2004
Bremen	7%	19%	24%	50%	2004
Dresden	24%	17%	21%	38%	2008
Göteborg	12%	14%	21%	52%	2004
Rotterdam	5%	14%	25%	56%	2004
Berlin	30%	13%	26%	31%	2008
Bonn	9%	13%	21%	57%	2004
Freiburg im Breisgau	11%	13%	12%	63%	2004
Hanover	9%	13%	29%	49%	2004
Bern	11%	11%	54%	24%	2001
Cologne	8%	9%	27%	56%	2004
Hamburg	8%	8%	33%	51%	2004
Munich	9%	8%	41%	41%	2004
Frankfurt	11%	7%	39%	43%	2004
Stockholm	15%	7%	43%	33%	2004
Helsinki	12%	6%	40%	41%	2004
Zürich	8%	5%	63%	25%	2001
Bologna	8%	4%	21%	67%	2001
Florence	8%	4%	21%	69%	2001
Bari	13%	1%	14%	72%	2001

Source: www Modal share - Wikipedia, the free encyclopedia

Costs of infrastructure and use of bikes

How much does a cycle track cost?

In Copenhagen it costs approx DKK 8 million to create 1km of cycle track and a further DKK 500,00 to mark 1km of cycle lanes. As a comparison, it costs DKK 1 billion to create 1km of metro and DKK 70-100 million for 1km of wide motorway.

Source:
http://www.bycyklen.dk/english/thecitybikeandcopenhagen.aspx

http://www.visitcopenhagen.com/transport/bike-city-copenhagen

Costs of bicycle infrastructure and cycling

1-For the cost of only 1 km of urban motorway we can construct either one of the following:

-150 km of cyclepaths

-10 000 km of ¨bandes cyclables¨ (painted cylepaths)

-100 km of zones 30 well designed

2-With a flow of demand equivalent, a cyclepath is:

-200 times cheaper than an urban motorway

-50 times cheaper than a metro with high capacity

-25 times cheaper than a streetcar (tram)

3-The cheaper modes for the user in Euros 2006 in an urban area (taking into account all costs including the use of the vehicle, the time of travel, speed, and an income factor):

By km:

-bicycle (0.64 euros)

-walking (1.78 euros)

- -auto (0.83 euros)

For a trip of 12 minutes:

-bicycle (1.78 euros)

-walking (1.67 euros)

-auto (3.66 euros)

Types of cyclepaths (see Wikipedia)

Separate cyclepaths

Shared cyclepaths (motorized & non-motorized)

Trails for bicycles

Cyclepaths for recreation

Some additional information in French:

Ordre de grandeur du coût des infrastructures

Mode	Infrastructures	Coût d'un km en millions d'Euros	Capacité maxi en personnes par heure et par sens
Vélo	• Piste cyclable unidirectionnelle de 1,50 m de large avec peu de traversées	0,2 M€	1 500
	• Bande cyclable unidirectionnelle avec traversées fréquentes	0,01 M€ *	1 000
	• Zone 30 bien aménagée	1 M€	
	• Aire piétonne	1 M€	
Auto-mobile	• Autoroute de campagne à 2 x 2 voies	7 M€	4 000
	• Autoroute urbaine à 2 x 2 voies	100 M€	4 000
	• 4 voies de contournement sans carrefours dénivelés	10 M€	2 000
Transports publics	• Bus en site propre	5 M€	2 000
	• Tramway	20 M€	6 000
	• Métro léger type VAL	50 M€	5 000
	• Métro lourd type Lyon, Marseille	80 M€	12 000

* Hors assise et revêtement. Sur une voirie nouvelle en périphérie, la bande cyclable nécessite un soubassement identique au reste de la chaussée, ce qui la rend plus chère qu'une piste.

Ordre de grandeur du coût des places de stationnement

Mode	Aménagement	Coût d'une place	Surface d'une place
Vélo	• Arceau posé (2 places par arceau et arceaux espacés de 80 cm)	50 €	0,8 m²
	• Parking vélo couvert (places sur 2 niveaux espacées de 50 cm)	600 €	0,8 m² *
Auto-mobile	• Place de parking le long du trottoir	très variable	10 m²
	• Parking en surface (hors achat du terrain)	2 500 €	25 m² *
	• Parking souterrain	15 000 €	25 m² *

* accès compris

Ordre de grandeur du coût des aménagements de carrefours

Mode	Aménagement	Coût en millions d'Euros
Vélo	• Mini giratoire (12 m de rayon maxi)	0,03 M€
	• Passerelle de 30 m	1 M€
	• Passage inférieur (réalisé dès l'origine)	1,5 M€
Auto-mobile	• Carrefour à feux	à partir de 0,1 M€
	• Passage dénivelé sous le carrefour	8 M€
	• Giratoire (30 à 50 m de diamètre)	0,5 M€

Sources:

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PAPON Francis, 2002, ≪ La marche et le vélo : quels bilans économiques pour l'individu et la collectivité ? ≫, *Transports*, 3 parties, n° 412,
413 et 414.

34. Information gaps

Information is scarce when the operator is private.

35. Reduction of CO2 emissions

Studies measuring in tons of CO2 the impact of cyclepaths are scarce. A study made in Puebla in a paradigm of bicycle use with 4% of total modal share, shows CO2 yearly emissions savings of 53,000 tons. This compares with the savings of a BRT actually in construction in Puebla with savings in the order of 40,000 tons.

Cycle paths and BSS can be an effective policy in terms of reduction CO2 emissions (Bussière, 2009). Cheap and with relatively fast results and easily transferable in urban areas of the North and of the South.

36. General comments on cycle paths

-Integrate cyclepaths in a general Transportation Plan.

-Elaborate a continuous bikeway network to make bicycle use a real alternative mode of transportation complementary with other modes.

-Better land use of downtown with less cars.

-Parking policy in the Center restricting long parking.

-Diminish car speed with zones 30 to augment security of cyclists and pedestrians.

-En zones 30 it is easier for cyclists and cars to share the road.

-Find shorter roads for cyclists for which two-way cyclepaths help.

-In roads with medium or high speed, introduce separated cyclepaths.

-Good signaling is important.

-Synchronize red lights for the pedestrian as well as for the cyclist.

-Promote permanently the use of bicycles.

-Implement safe parking for bikes in houses, business areas, public services, work places.

-Insure stable financing to bicycle policies.

-Insure safe bike roads to the young to go to school.

-Have specialists of bike use.

-Implement efficient modes to control speed of motorized modes that could be in conflicts with bike use.

37. Further work for the students

Evaluate in a specific city (preferably their own) if BSS and pro-bike policies are possible and sustainable. The main questions to answer would be:

-Is the public favorable?

-Is there a potential demand?

-How many kilometers of cycle paths should be installed?

-What kind of cycle paths? Completely separated or sharing with other traffic?

-Is it financially sustainable? What would be the main sources of financing?

-What would be the tariffs?

-Would it need subsidies?

-What would be the social benefits on a Cost-Benefit approach?

-What could be a reasonable short and long term objective in modal share of the bicycle?

-What would be the modal shift in favor of bike use (from walking, bus, car passenger, car driver)?

-Consequently, what could be the impact on reduction in CO2 emissions?

-What would be the cost-effectiveness of such a policy compared to other actions in terms of cost and time of implementation?

The students could have an overview on the best practices and try to create a paradigm of bicycle use in a city of their choice (preferably their own).

38. Sources

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www.wikipedia

web sites of cities

39. Credits

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