

Bicycle Lifestyles in Beijing and Their Relevance for a Benign Development of Future Cities.

Florian Lorenz^{*1} and Shannon Bufton²

¹Researcher, Smarter Than Car, Beijing, China

²Founder, Smarter Than Car, Beijing, China

Abstract

Incorporating bicycle lifestyles into design bears unused potentials for policy makers and urban designers to re-structure future cityscapes. In this paper we examine contemporary bicycle lifestyles in Beijing, China to show their role in creating urban livability by servicing urban communities in a culturally diverse, socially valuable and environmentally benign way. We present the results of on-site surveys obtained in and around Beijing's DongCheng district which investigated livelihoods organized around the bicycle. We present structural, social and economical traits for bicycle livelihoods with an emphasis on bicycle repair stations as an essential element of Beijing's bicycle culture. We discuss the bicycle's role as a catalyst for urban livability, flexibility of bicycle services, clustering of bicycle services within the cityscape, processes of urbanism by individuals, importance of bicycle infrastructure and contemporary erosion of the bicycle culture in Beijing. We conclude that bicycle-based retail and service needs to be supported by policy makers and urban designers in order to realize its full potential for benign urban development. We therefore put forward specific suggestions for both, policy makers and urban designers.

Keywords: Cultural exchange, Low-carbon mobility, Bicycle lifestyle, Urban livability, Cityscape

1. Introduction

Cycling is increasingly being promoted by urban designers and policy makers because of reasons such as traffic congestion, environmental conservation, health benefits and urban liveability [1]. Urban design can effectively influence people's travel behaviors and demand for certain types of mobility [2]. A shift from motorized vehicles towards bicycles can significantly reduce the greenhouse gas (GHG) footprint of personal mobility [3] and in equal measure, counteract rising air pollution and GHG emissions. Lifestyles integrating pedal-powered mobility may therefore be called lifestyles of low-carbon intensity.

The development of a functioning bicycle infrastructure is cost-effective [4] due to an increase in population health [5]. A shift towards policies promoting bicycle use rather than car use can - on a city scale - alter the use of public space and raise the quality of urban life [6]. This was demonstrated in Copenhagen, Denmark, where urban development policies and endogenous dynamics within the cycling community created a city-specific bicycle culture, represented in cycling infrastructure, practices, policies, organizations and subcultures [7]. Investing in urban bicycle culture is

therefore a promising strategy to improve environmental performance, social life and cultural diversity in cities while at the same time engaging residents in a healthy amount of physical activity. Because of such benefits, city governments worldwide are nowadays increasingly supporting the use of bicycles [8].

This international trend is contrasted by the current erosion of bicycle culture in a previous 'bicycle heaven', the city of Beijing, China, where rapid urbanization is jeopardizing a once well functioning bicycle culture. Since the 1950's modernization of the City has been a high priority for the Beijing Government which was reflected in policies supporting the use of cars for personal mobility. In Beijing, bicycle use for transportation has been significantly shrinking with a drop from 58 to 38 % between 1986 and 2000 [3]. In 2006 cars surpassed bikes for the first time as most frequent mode of transportation in Beijing [9]. It is important to note that modal split of bicycle use in Beijing is with 38 % (figure for 2000) still comparable to the modal split of the European urban bicycle role-model Copenhagen, where 37 % of trips are undertaken on bikes [6]. Reasons for this still considerable bicycle use are that cycling is the most efficient and affordable mode of transport in Chinese cities which often accommodate cycling with flat topography and mild climate [10]. Currently, the conflict between tradition and modernization leaves Chinese bicycle culture at the crossroads where bicycle use may further diminish, stagnate or again grow.

*Contact Author: Florian Lorenz, Researcher, Smarter Than Car
Address: Rilkestrasse 1, A-6020 Innsbruck, Austria
Tel: +43-650-9463993 Fax: -
e-mail: florian.lorenz@gmail.com

The NGO ‘Smarter than Car’ is closely following this development in Beijing and chose to engage in research projects at this decisive point in time. After heavy traffic jammed Beijing over the past 6 months, the municipal government of Beijing released in 2011 a 5 year action plan to combat traffic congestion [11]. The plan includes limiting the number of new car licenses to 240,000 in 2011, and installing 1,000 bicycle rental spots with 50,000 bikes near transportation hubs. This may be a starting point for more bicycle-supportive policies in Beijing which can help to avoid traffic-congestion [10], lead to increased urban livability and provide low-carbon transport services. Moreover, comprehensive strategies incorporating non-motorized transport will (again) become important as current transportation in China may encounter problems of energy supply in the near future [12]. Supporting non-motorized transportation can be a cost-effective urban development strategy as soaring car use is currently leading to high external costs in terms of public health, building deterioration and crop losses in and around Beijing [9].

In this paper we describe possible further benefits of a functioning bicycle culture which are relevant to designers and policy makers engaged in shaping urban futures worldwide. Bicycle culture can (at least) fulfill two functions in cities: efficient personal mobility and provision of services in urban areas. Urban services such as vending of retail items, transport services or specialized services can be organized on bicycles to service the cityscape in a spontaneous and adaptive way and represent a bicycle-based economic livelihood within urban areas. A community of pedal-powered servicemen can supply urban populations reacting swiftly to changing urban conditions, thereby creating a lively and diverse cityscape.

In this paper we aim at providing previously untapped knowledge about a bicycle-based service culture in Beijing to allow policy makers, urban planners and architects in China and globally to design more bicycle-friendly future cities. We focus on (I) urban livelihoods in Beijing, China, which employ the bicycle to service communities and (II) the role of bicycle repair stations (BRS) in maintaining the functioning of the overall bicycle culture. We aim at understanding the diversity of urban service functions provided by Beijing’s bicycle culture and its integration into the urban layout of contemporary Beijing. We hypothesize that bicycle lifestyles bear unused potentials for policy makers and urban designers to restructure cityscapes in a cultural and environmental benign way.

2. Methodology

The study area was DongCheng district and surroundings in central Beijing. The core study area is an approximately 700 by 800 meter sized urban block with traditional Hutong structure which is bounded by arterial roads and to the north located adjacent to

Beijing’s second ring road (figure 1). The streets inside the urban block are primarily local and suited to slow moving traffic and to accommodate pedestrian and bicycle movement.



Figure 1: Localized bicycle livelihoods within the DongCheng sample superblock. The map shows the locations of different bicycle livelihoods: mobile business (pink), transport and delivery (yellow), mobile craft service (blue), rickshaw for elderly (orange), mobile craft and retail (red) and street cleaning as well as recycling services (brown).

We focused our field research on bicycle-based activities (livelihoods) such as vending, transport or specified services. As a specific bicycle-related, small-scale infrastructure we surveyed bicycle repair stations (BRS).

On-site surveys were conducted on bike between autumn 2010 and March 2011. We used a digital pocket camera with high resolution and a camera hidden in a bicycle to document observations. The hidden camera was essential as bicycle-based small scale commerce and services in Beijing are operating in a gray zone because small scale commerce on the bike is illegal in Beijing.

Images were collected, screened for quality and then selected depending on image content as relevant to the research topic. We then classified images assembling batches relating to bicycle livelihoods and BRS. Excel spreadsheets were used to register the extracted information from onsite surveys. In these files we horizontally aligned various urban situations; vertical columns were used to register specific traits of the single observations in terms of urban context, physical layout, social structure and economical traits.

We then clustered observations of reoccurring traits to form classes and typologies of bicycle livelihoods and BRS which we then analyzed according to urban context, physical layout, demographics of operators and economical structure.

3. Results

A total 63 different bicycle livelihoods were observed around Beijing's DongCheng District. Numbers in the paragraph below give the percentage of total observations.

Bicycle livelihoods are almost exclusively operations of individuals (98%) and mostly organized with tricycles (83%) or conventional bicycles (17%). The estimated age of the operators was to one third between 20 and 40 years (33%), to 56 % between 40 and 60 years and for a percentage of 11% over 60 years. The gender of operators observed was mainly male (82%).

Table 1 shows the diversity of goods sold, delivered and transported as well as the diversity of services provided by bicycle-based businesses and services.

The biggest fraction of bicycle livelihoods were observed in older parts of downtown Beijing (79%) compared to more modern parts of Beijing (21%). We mapped out the locations of bike livelihoods within the superblock in the study area DongCheng (Figure 1). Services in relation to passengers are located at the fringe of, or on busy streets inside the superblock. Specialized retail and community services such as street cleaning were found more dispersed inside the superblock.

We classified the observed bike livelihoods into mobile business (44%), transport and delivery services (27%), mobile craft service (11%), rickshaw services for elderly (10%), mobile craft and retail (5%) and street cleaning (3%) (figure 2).

The percentages in the following paragraph give the percentage of total number of observations (n=25).

According to the structural traits identified within BRS we classified them into three basic typologies. BRS based on a closet located at a fixed location in public space (36%). Mobile BRS mounted on tricycles (32%) and BRS structurally embedded in buildings as roadside shops (32%). BRS operators organize their business in different ways. Most specialize on bicycle repair (64%), others either sell additional goods (20%) or offer another, additional service (16%), such as locksmith, shoe repair or laundry service (Figure 3).

The physical layout of identified BRS always included an outdoor working area (100%) appropriated from public space. BRS were often located evenly on street level (56%). The footprint of BRS (including outdoor working area) was found as below 5m² (40%), between 5 and 10 m² (44%) and between 10 and 15 m² (16%). BRS were often located in traffic reduced areas on sidewalks or close to existing bicycle infrastructure (Table 2).

Table 2: Observations of urban context of bicycle repair stations (BRS). Percentage gives incidence of urban context within the total of BRS (n=25).

Urban context of BRS	%
Traffic-reduced area	76
Located on sidewalk	76
Viewing distance to bike lane	36
At key bike thoroughfare	32
Inside Hutong	28
Close to main road intersection	24
At fringe of Hutong	20
On boulevard	16
Next to subway station	4
At residential compound	4

Table 1: Diversity of retail items, goods transported and delivered as well as mobile craft services. Percentages represent incidence within total number of observation of bicycle livelihoods (n=63).

Mobile Business		Transport and Delivery		Mobile craft service	
retail items	%	goods	%	type of service	%
sweets/snack foods	10	produce (flour, rice)	6	hairdresser	4
vegetables/fruit	8	furniture	5	bike-repair	3
newspapers	5	milk/yoghurt	5	knife-sharpener	3
birds (pets)	5	styrofoam	3	cooking	3
freshly cooked food	3	stove(parts)	3	locksmith	2
ornamental fish	3	not identified/packed	3		
bike locks	3	eggs	2		
hot food	3	paper waste	2		
nuts	2	recycled cardboard	2		
saddles	2	bottles water dispenser	2		
rabbits (pets)	2	plastic boxes	2		
pet food	2	propane bottles	2		
bakery/bread	2	empty plastic bottles	2		
incense	2				

BRS frequently attach to existing urban structure such as existing businesses (40%), walls (36%), fences (32%), electricity poles (24 %) or trees (16%). In some cases, BRS directly adapt to the urban structure next to them. We identified mechanisms of locking into the street (28%), using bricks or concrete blocks as structural elements (24 %) or adopting street demarcations to border the BRS (16 %) (Table 3).

Table 3: Adaptations of urban structure by bicycle repair stations (BRS). Percentage gives incidence of adaptation within the total of BRS (n = 25).

Adaptation of urban structure by BRS	%
Locking BRS into street elements	28
Bricks and concrete blocks part of BRS	24
Street corner as working area	24
Shelter from tree canopy	20
Adopted street demarcation	16
Stairs for seating	8
Fusing with urban structure	4

4. Discussion

4.1. Catalysts for Urban Liveability

The retail items and goods delivered and transported show the diverse range of services within the study area which are successfully organized by means of low carbon mobility (Table 1). Small scale bicycle based businesses are servicing communities in an individual and specialized way as almost all businesses found were individually organized (98%). The bicycle livelihoods found in this study thereby create urban livability by servicing the community in an environmentally and socially benign way. This demonstrates the potential to organize the supply for urban communities based on bicycle, underlining potentials for urban designers to consider pedal-powered services in their designs. The greatest part of services is organized with tricycle, reflecting that planners and policy makers may extend their understanding of bikes for this category of vehicle. We suggest the potential to creatively service the city by means of bicycle (and tricycle) which seems at this point greatly underestimated by urban designers and policy-makers.

4.2. Flexibility of Bicycle Services

The low redundancy of retail items and goods delivered points towards a high specialization of small-scale bicycle-based businesses (Table 1). In this context, it is important to understand that bicycle-based businesses are foremost mobile and constantly moving across the city to follow a market changing during the day. Bicycle-based retail and service therefore represent

an efficient way of servicing the urban population. In this sense, the map in figure 1 represents a snapshot for the temporary status of bicycle-based businesses within a certain area. For future studies we suggest mapping methods which capture and help understand temporal changes in relation to locations within the cityscape.

The variety of bicycle livelihoods presented in figure 1 echoes smart business strategies of individuals realized at low investment costs (tricycle and a few auxiliaries) by employing the possibilities of public space. This smartness of operations was as well found for the diversity of business models within the BRS (Figure 3). Bicycle livelihoods can in this way act as strategy for policy makers to support economic equity and equal opportunities within urban populations [13].

4.3. Clustering within the Cityscape

Bicycle repair stations and pedal-powered services as well as small businesses often attach either to existing businesses or to specific, highly frequented transportation hubs such as subway stations or bicycle thoroughfares (Figure 1 and Table 2). This clustering of activities occurs as well among bicycle services over time as for example vendors create a temporary ‘urban market’ at a specific place which offers a range of products, services and food sales. Bicycle livelihoods thereby provide a very convenient and adapted service for the residents of a city which adds up to the quality of urban life by creating a diverse and continuously changing array of temporarily clustered service and retail options.

4.4. Urbanism by Individuals

As bicycle livelihoods exclusively take place in open space we observed mechanisms of how operators of bicycle-based businesses and services appropriate and change urban open space over time. The process of attachment was observed for BRS which were found close to existing businesses, electricity poles, fences or walls. These temporary operations in public space can

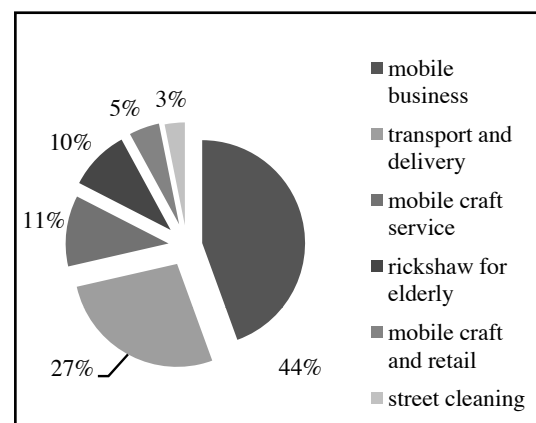


Figure 2: Types of observed bicycle livelihoods.

Percentages represent the incidence of bicycle livelihood within the studied sample (n = 63).

become more permanent and physically manifested as we observed in certain adaptations of urban structure (Table 3): Operators would for example start to confine their territory by using urban landmarks or concrete blocks to demark their workspaces (sized between 5 and 15m²) as opposed to public space. In some cases the operators of BRS started to solidify their activities on a specific spot by locking a closet onto a fence or demarking their space overnight with bicycles tied together. One BRS even adopted an electricity pole to build a sunshade.

The bicycle repair stations and other bicycle based businesses are an example of how a cityscape can be appropriated, adapted and changed over time by individuals who identify themselves with certain locations in public space. We believe that this phenomenon of stewardship for urban space points out potentials for urban designers to employ and support self-organizing capacities of urban populations. Regarding the support of pedal-powered retail and service, it may be important to provide urban structures which can readily be adapted by operators of pedal-powered businesses. In subsequent research we aim at identifying traits for such infrastructure and open spaces.

4.5. Importance of Bicycle Infrastructure

The case of bicycle repair stations (BRS) is an essential and traditional element of a functioning bicycle culture in Beijing. We interpret the variety of business models found within the BRS (Figure 3) and typologies represented as an indication of a strong demand for these services. Furthermore, BRS showed a certain affinity to existing, bike related infrastructures (Table 2) reflecting that urban designers may include such small scale infrastructure into future urban planning and design [10].

The diversity of business models within the BRS (Figure 2) and the multitude of social interactions found at the BRS let us assert that BRS are not only vital for

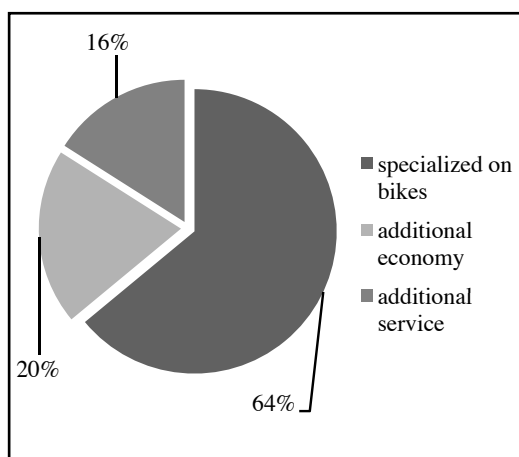


Figure 3: Economic organization of bicycle repair stations (BRS). Percentages represent the incidence of types of BRS within the studied sample (n = 25).

a functioning bicycle culture, but are as well important elements in the social fabric of the community. We put forward that BRS - as a specifically adapted typology of public service in open space - bear unused potentials to support bicycle cultures (and urban life) in other parts of the world as well.

4.6. Supporting a Threatened Bicycle Culture

Despite the abovementioned advantages of bicycle-based businesses and services there is evidence that this valuable culture is in decline in Beijing. Firstly, the illegal character of bicycle-based operations makes it difficult for individuals to fully play out the potentials of their businesses. Secondly, operators of bicycle-based businesses and services were mostly older than 40 years. Thirdly, many bikes used for small scale businesses were found to be old and ill maintained. This leads us to exert that the bicycle livelihoods observed are rather remnants of an already peaked bicycle culture than witness of a currently vibrant bicycle culture.

Furthermore, bicycle livelihoods were mostly found in the traditional cityscape of Beijing, which may reflect that bicycle livelihoods are more abundant in these urban areas where less competition from motorized transportation occurs. China's rapid urbanization may enhance the use of motorized transport [2] and further minimize the diversity of individualized bicycle-based services within Beijing. We therefore see a need to further study Chinese bicycle culture in Beijing and other Chinese cities before it dissolves even further. Additionally, there is an apparent need for bicycle-supporting policies if Beijing decides to maintain its benign bicycle culture. Rather than reflecting Western policy-models, such policies ought to be well-adapted to the specific Chinese context [14], which was described in this study and possible future work.

5. Conclusions

In this paper we showed examples of an eroding bicycle culture in Beijing, China, which manages to service the population of more traditional urban areas in an individualized and environmentally friendly way while being able to significantly contribute to urban livability. We discussed that this bicycle culture is related to a specific urban form, able to autonomously adapt the cityscape in a creative way and worth to be supported by a specific policy framework.

We conclude that the example of bicycle livelihoods in Beijing, China is a subject of great potential for further research and can be an interesting lesson for cultural exchange between East and West. We close with putting forward specific recommendations for policy makers and urban designers to support such a bicycle culture for contributing to a sustainable urban development of Beijing and other cities.

Policy makers in China (and elsewhere) can set the framework to make small scale bicycle-based businesses and services legal, stopping the marginalization of this culture and leading to new income opportunities with

low entry thresholds in terms of initial investment. They as well can support the use of tricycles which showed a huge potential for servicing urban communities for a variety of functions. Chinese policy makers may thereby proudly embrace the potentials of a diverse and functioning bicycle culture to create culturally vibrant and environmentally as well as economically sustainable cities. This would allow China to show a unique and forward-thinking policy approach in terms of bicycle culture and allow China to build benign cityscapes by learning from the vibrant life in contemporary Chinese cities.

Urban designers (as well represented by architects, urban planners and landscape architects) may learn from the multitude of businesses and services provided by bicycle-based operations and more creatively think about potentials to support such lifestyles. Such measures may be creating open spaces where temporary bicycle-based retail or service can take place and form temporary markets. Specific bicycle related infrastructure may be introduced to cities such as parking sheds for bicycles used for retail, transport or service. Within the urban fabric, specific locations can be identified and designed where craft services can attach to and find amenities needed for their businesses. Not least, smart cities may provide soft infrastructure networks to connect demand and supply of spatially flexible, bicycle-based retail and service.

The team of 'Smarter than Car (STC)' will continue to research bicycle culture in Beijing and across the globe and put forward strategies of how to support a bicycle-based servicing of urban communities. In our work we aim at supporting the exceptional bicycle culture found in Beijing today, and in future want to support the development of new types of attractive urban infrastructure to animate bicycle culture in Beijing.

6. References

1. Blanco, H., et al., *Hot, congested, crowded and diverse: Emerging research agendas in planning*. Progress in Planning, 2009. **71**: p. 153-205.
2. Pan, H.X., Q. Shen, and M. Zhang, *Influence of Urban Form on Travel Behaviour in Four Neighbourhoods of Shanghai*. Urban Studies, 2009. **46**(2): p. 275-294.
3. Liu, J.R., R.S. Wang, and J.X. Yang, *A scenario analysis of Beijing's private traffic patterns*. Journal of Cleaner Production, 2007. **15**(6): p. 550-556.
4. Saelensminde, K., *Cost-benefit analyses of walking and cycling track networks taking into account insecurity, health effects and external costs of motorized traffic*. Transportation Research Part a-Policy and Practice, 2004. **38**(8): p. 593-606.
5. Pucher, J., et al., *Walking and Cycling to Health: A Comparative Analysis of City, State, and International Data*. American Journal of Public Health, 2010. **100**(10): p. 1986-1992.
6. Gehl, J., *Cities for People*. 2010, Washington: Island Press.
7. Tragellis, A., Lopez, K., Ilyashenko, A., *Communicating Danish Bicycle Culture to Visitors in Copenhagen*. 2010, Dansk Cyclist Forbund: Copenhagen.
8. Pucher, J., J. Dill, and S. Handy, *Infrastructure, programs, and policies to increase bicycling: An international review*. Preventive Medicine, 2010. **50**: p. S106-S125.
9. Creutzig, F. and D.Q. He, *Climate change mitigation and co-benefits of feasible transport demand policies in Beijing*. Transportation Research Part D-Transport and Environment, 2009. **14**(2): p. 120-131.
10. Liu, X., Wei, H., Guan, H., Ma, J., *Repositioning Bicycling in Transportation Policies and Strategies from the Perspective of Mode Choice Changes in Large Chinese Cities*, in *TRB 82nd Annual Meeting*. 2003: Washington, D.C.
11. Anon, *Advices for promoting capital transportation technology development and decrease traffic congestion*. 2011, Beijing Municipal People's Government: Beijing.
12. Yan, X.Y. and R.J. Crookes, *Energy demand and emissions from road transportation vehicles in China*. Progress in Energy and Combustion Science, 2010. **36**(6): p. 651-676.
13. Ahmed, Q.I., H.P. Lu, and S. Ye, *Urban transportation and equity: A case study of Beijing and Karachi*. Transportation Research Part a-Policy and Practice, 2008. **42**(1): p. 125-139.
14. Wang, R., *Shaping urban transport policies in China: Will copying foreign policies work?* Transport Policy, 2010. **17**(3): p. 147-152.