Assessing Options to Enhance Bicycle and Transit Integration

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Cycling continues to increase in popularity and garner attention for the ability to achieve environmental, health, and congestion-mitigation benefits for communities. Although the growth in both cycling and transit may be in small part attributed to bicycle and transit integration, the growth is difficult to measure. Which of the variety of available strategies for bicycle and transit integration—such as increased bicycle parking at stops, increased bicycle capacity on transit vehicles, and shared bicycle infrastructure—is more cost-effective? Which strategies will yield the highest number of cycle transit users? To fill a void in the literature about integrating bicycling and transit, four common bicycle and transit integration strategies were described and assessed. A framework was developed for evaluating strategies, and a preliminary cost-effectiveness assessment was conducted. Cost-effectiveness comprises costs and cyclists' preferences for each strategy. Preferences were gathered through stated-preference surveys from focus groups in five case study communities and calculated according to the analytic hierarchy process, a multi-criterion decision-making tool. Transit with a bicycle aboard was most preferred by cyclists, whereas results of the cost-effectiveness measure suggest that enhancing bicycle parking at a transit stop proved most cost-effective when compared with the most common bicycle onboard transit configuration: front-mounted bicycle racks on buses. The limited growth potential for bicycles aboard transit requires consideration of alternatives. The overall importance that cyclists assigned to security suggested considerable room for creative solutions to improve the favorability of the other strategies while addressing some inherent capacity limitations of the most popular strategy: transporting the bicycle with the rider on transit.

Cycling continues to increase in popularity and garner attention for its acclaimed ability to achieve various environmental, health, and congestion-mitigation benefits for communities. Available transit ridership reports suggest that the United States had the highest transit use in 52 years in absolute terms in 2008 despite falling gas prices (*1, 2*). Although the growth in both modes may be in small part attributed to more attention to strategies for integrating the two modes—bicycling and transit—knowing how to jointly plan for such is an issue that continues to stump bicycle and transit planners (*3, 4*).

With the variety of available strategies for bicycle and transit integration—increased bicycle parking at stops, increased bicycle capacity on the transit vehicle, shared bicycle infrastructure, to name a few—it is difficult to know the most cost-effective strategies. Which strategies will yield the highest number of cycle transit users (CTUs)? Although some research reports comment on logistics or user preferences of some of these strategies, a common framework is lacking to assess the comparative advantages of each strategy. Several reasons for this include a lack of methodologies and applicable data, and only recent realization about the potential of such integration.

To fill a void in the literature about integrating bicycling and transit, this paper serves three purposes. First, four strategies are described to enhance integration of bicycle and transit strategies (referred to as integration strategies) and provide anecdotal assessment of the four based on cyclists' preferences gathered from focus groups in five communities. To help describe the four integration strategies, a table is offered, summarizing the advantages and disadvantages to cyclists and to agencies and communities. One core issue is that the most common strategy in the United States, transporting the bicycle with the rider on transit, frequently runs up against capacity limitations. Second, a framework evaluates each of the strategies, comprising costs and cyclists' preferences for each of the strategies. Finally, results of a cost-effectiveness measure are presented. The preferences were gathered from focus group surveys and calculated with the analytic hierarchy process (AHP), a multicriteria decision-making tool.

WHAT IS KNOWN ABOUT BICYCLE AND TRANSIT INTEGRATION

To date, a minimal but growing amount of published material documents how bicycling can best be integrated with transit. Successful integration of bicycles and transit might increase the (*a*) catchment area and subsequent patronage of transit, (*b*) efficiency of transit by reducing the necessity of feeder bus services, and (*c*) overall demand for cycling (*5*). Most studies on the detailed nature of transit stops or transit-oriented development focus on a ½-mi or 1-mi walking distance area; however, allowing for a 2-mi-radius bicycle shed exponentially increases the number of people with good transit access. This measure could reduce the required number of automobile parking spots at park-and-ride lots. A customer satisfaction survey of rail users revealed that improving transit access would increase ridership at the periphery of transit systems and be more cost-effective than feeder bus services (*3, 6*). In urban areas with well-established transit systems, increasing transit level of service would be more likely to increase ridership.

Literature on bicycle and transit integration also documents four factors influencing the share of CTUs: (*a*) mode of transport, (*b*) location of transport within an urban area, (*c*) egress catchment area, and (*d*) purpose of trip (*5*). Transit services carrying users relatively long distances [i.e., 48 km (30 mi)] with relatively few stops (e.g.,

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Transportation Research Record: Journal of the Transportation Research Board, No. 2217, Transportation Research Board of the National Academies, Washington, D.C., 2011, pp. 162–167.
DOI: 10.3141/2217-20

commuter rail or express buses) tend to draw a larger share of CTUs than do slower and shorter-distance routes (*7, 8*). Two European studies found that suburbs generate higher levels of CTUs than cities do. In transit-rich, compact cities, transit and walking are attractive alternatives to the bicycle, whereas bicycles provide a more efficient mode in suburbs with less frequent transit service and greater access distances to transit (*9*). Across all transit modes in referenced countries, egress distance at the end of the journey seems relatively consistent. Egress catchment areas are small and typically less than two km (1.2 mi). Finally, a majority of CTUs combines bicycle and transit trips for work and education purposes (*10, 11*).

The aforementioned four factors frequently run up against a key barrier to integrate the two modes—capacity restraints (typically two or three bicycles per bus or three to four bicycles per light rail car) with the cyclists' commonly preferred approach, transporting the bicycle with the rider. Although existing cycling-transit capacity could be adjusted at the margins with these approaches (e.g., through incentives, exploiting technology to enhance communication between riders), the opportunity is ripe to consider broader solutions—solutions with a dearth of information. An outstanding question in any initiative is this: What are the costs of feasible integration strategies and which alternative provides the most effective solution?

Effectively integrating bicycling and transit requires full analysis of the travel patterns and needs of individuals, key characteristics of the built environment (e.g., density, bicycle facilities), but also an analysis of strategies for integrating the two modes. The four strategies most commonly considered include the following:

1. Bike on transit. Transporting the owner's bicycle aboard (inside or outside) the transit vehicle,
2. Bike to transit. Using and parking the owner's bicycle at a transit access stop,
3. Two bike. Using an owner's two bicycles to access and egress transit, and
4. Shared bike. Sharing a bicycle, which would be based at either the transit access or egress point.

Each alternative has a considerably different consideration from the perspectives of cost (to the user or community), convenience, needs of infrastructure, and benefits (to the user or community). Furthermore, such considerations are complicated by the variety of types of users, their frequency in using a bicycle, and the variety of characteristics of urban forms (Table 1).

APPROXIMATE COSTS OF BICYCLE AND TRANSIT INTEGRATION

Important for any assessment are the relative costs. Costs include those of the infrastructure associated with integration strategies, such as bicycle racks on and in transit vehicles, shared bicycle program costs, and others. For this initial exploration, it was considered too difficult to sufficiently capture other costs, such as a second bicycle, for the two bike strategy (bicycle costs vary considerably) or the costs of purchasing real estate or additional concrete pads, and so on. According to information gathered in September 2009 from the five largest bicycle parking manufacturers, the majority sells a select number of common designs in addition to their own unique racks. The most common racks include the two-bicycle "U" or staple rack, single-pole bollard racks or hitch racks, serpentine racks, and hanging loop racks (Table 2).

The most commonly used equipment on transit for bicycles is the front-end folding bicycle rack. Recent estimates from Sportworks informed this study; bicycle on bus racks range in cost from \$467 (two bicycles, galvanized) to \$1,332 (three bicycles) for stainless steel. Pricing for each bicycle rack capacity, two- or three-bicycle racks, varies depending on materials. According to Sportworks, its most popular two bicycle rack sells for \$720. Recently, King County Metro, Washington, retrofitted the majority of buses with three-bicycle racks for an average of \$970 (Sportworks, personal communication, Aug. 25, 2009). In addition to the cost of the racks, buses require a custom bus rack adapter, priced from \$200 up to \$400.

TABLE 1 Anecdotal Assessment of Options

	Advantage		Disadvantage	
Option	To User	To Agency or Community	To User	To Agency or Community
Increase bicycle capacity on the transit vehicle	Limited increase in flexibility, security, guarantee	Potential for limited gain in ridership, reduced automobile parking needs	Depending on transit type, excess capacity may be quickly used up, limited growth potential (mode dependent)	Extensive costs; limited gain in ridership; potential to increase dwell time, costs, and liability; limited return on investment
Enhance parking at transit stop	Potential to increase security and weather protection and to ease crowding, if short egress distance	Potential to decrease dwell time, to increase CTUs, and to discourage bike on transit	Some bicycle parking facilities (e.g., lockers and corrals) may increase access distance to transit	Secure parking options such as bicycle lockers or corrals may present moderate to high costs
Bicycle sharing at access or egress location	Potential to address capacity limitations of bike on transit, and to address final mile problem	Potential to decrease dwell time, to increase CTUs, and to discourage bike on transit	May not be of interest to user, additional expenses for program	Significant capital costs, difficulty in implementation
Employ user's second bicycle at egress location	Potential to address capacity limitations of bike on transit, and to address final mile problem	Potential to decrease dwell time, to increase CTUs, and to discourage bike on transit	Security concerns, moderate costs	Secure parking options such as bicycle lockers or corrals may present moderate to high costs

TABLE 2 Average Costs of Bicycle Parking Racks

Type of Rack (bicycle capacity)	Average Cost ($) (no. of companies)
U-rack or staple rack (two)	129 (5)
Bollard type (two)	172 (4)
Serpentine (five)	343 (4)
Serpentine (nine)	528 (4)
Hanging loop (five)	472 (4)
Hanging loop (10 or 11)	822 (4)

NOTE: Information gathered September 2009.

The bicycle parking manufacturers also provided anecdotal information about rack types. Several companies expressed security concerns about hanging loop racks. Despite their popularity, they are more readily vandalized owing to nature of the welds. As one company explained, welds of various diameter of tubes compromise the structural integrity of the materials, increasing the risk of theft. Another consideration is the quality of materials. Manufacturers preferred stainless steel over galvanized steel for the durability of bicycle racks, and powdercoating over rubber coating for similar reasons. The foregoing description is a bit simplistic although necessary. It would be prohibitively difficult to incorporate all costs associated with the integration strategies, such as the cost to transit agencies of removing seats on transit vehicles for bicycle storage, or real estate costs for increased bicycle parking.

FRAMEWORK FOR ASSESSMENT

Evaluation studies are useful to assess integration strategies because they place myriad factors into a common framework. For example, benefit–cost analysis weighs the total expected costs of any alternatives against the total expected benefits of one or more actions—placing both in consistent monetary terms—to choose the best or most profitable option. Optimization studies obtain best available values of some prescribed objective function, given defined conditions. Arguably, the most applicable evaluation for bicycle and transit integration, cost–effectiveness, considers a microview of activities, outputs, or outcomes of a particular program and informs the degree to which competing programs maximize effectiveness and reduce costs.

Frameworks for cost-effectiveness analysis (evaluation) come in many shapes and sizes but typically require considering four broad factors: (*a*) costs of different alternatives, (*b*) likely effectiveness of each alternative, (*c*) potential externalities (positive or negative), and (*d*) weights assigned to those three factors (e.g., possibly, by different perspectives or interest groups). Each factor could be assessed by monetary terms or through a variety of indices; when considering relatively intangible phenomena, analysts find the latter more useful. Any research that captures these dimensions will provide much-needed inputs to inform necessary parameters. The aim is to evaluate programs and inform alternatives that maximize attainment of goals within various constraints (costs and other). Alternatives are prescribed for how various CTU planning issues might be best addressed and analyzed under such a framework.

- Costs. Costs associated with integrating bicycles and transit are relatively straightforward and were measured per unit (dollars per expected CTU) for various alternatives. Cost estimates were gathered from the five largest bicycle parking manufacturers in September 2009: Bikeparking.com, Dero, Huntco, Madrax, and Saris. The number of bicycle parking spots per unit consisted of company-reported data, not actual available space. Land for bicycle parking was assumed as owned by a municipality and available.
- Effectiveness. The primary measure of effectiveness is developed with an AHP, conducted through the focus groups. The AHP was constructed to gauge cyclists' preferences for the integration strategies.
- Externalities. Any analyzed alternative needs to account for externalities that may be imposed on other populations. For example, a relaxed policy about bringing bicycles aboard light rail cars may affect other users; during rush hours, it may even decrease overall capacity of the transit vehicle. Alternatively, increasing the attractiveness of bicycles on transit has increased overall ridership for the Caltrain route from San Francisco to Gilroy, California, in a corridor with relatively long egress distances. Or CTUs who have to wait because capacity has already been reached would need to be considered. Externalities are difficult to quantify, though indirectly captured in stated-preference surveys during focus groups, thus providing initial reactions for key issues.

ASSESSMENT CHALLENGES

The outstanding issue is that a demonstrated methodology does not exist (neither do completely suitable data) to gauge the effectiveness of planning options. Therefore, the research borrowed from theories or approaches of closely aligned initiatives on cycling behavior or transit use, or both.

Then there is the task of best gauging how well the hypothetical services will be received and used—something not entirely reliable given the hypothetical nature of the subject. Assuming that some applications have been employed, revealed-preference data could be collected. The researchers are aware of only one application (in Boulder County, Colorado) in which data were collected on preferences for a bicycle adoption program, and there it was on too small a scale and too preliminary to be exceptionally valuable. Alternatively, one can borrow from other applications and approaches that have been employed to assess the impact of hypothetical services, that is, data on stated preference. Using this method has certain advantages. With use of consumer-revealed preference, a limitation often arises because only the final consumer choice is observed, not the intermediate choices available to a consumer, nor information on alternatives that went into an individual's decision. Even in cases where all possible alternatives are known, it is difficult to assess whether decision makers considered all available alternatives.

The approach to collecting stated-preference data revolved around focus groups conducted in five settings: Boulder and Denver, Colorado; Chicago, Illinois; Ithaca, New York; Portland, Oregon; and Santa Clara County, California. The focus groups included structured surveys and discussions about advantages and disadvantages of the integration strategies. The five locations were chosen to balance several considerations, including (*a*) geographical representation across the United States, (*b*) variety of transit services and urban forms (e.g., light rail or bus only, college town or big city), (*c*) availability of skilled facilitators, and (*d*) available resources.

Data from the stated-preference survey inform the AHP to evaluate cyclists' preferences for integration strategies. The AHP, a multicriteria decision-making tool, prioritizes and weights different factors associated with a complex issue. The AHP reduces a complex issue into key elements, individually compared in a paired fashion on a numeric, reciprocal scale from one to nine. The tool quantifies which strategy is most attractive to cyclists based on how each strategy ranks on a predetermined number of criteria, providing a clear rationale for selecting one strategy. Examples of AHP use in the planning field include integrated watershed management and regional planning projects for land use, through its valuation of community preferences (*12, 13*). The AHP process was selected for this project because of its suitability for group decision making; it may be replicated and provides a measure of consistency (*12*). Participants in a study ranked AHP as the most trustworthy and least difficult among methods studied (*14*).

DEVELOPMENT OF ANALYTIC HIERARCHY PROCESS MODEL

The goal of the analysis is to determine a preferred integration strategy (from the perspective of users) and understand criteria most important in determining cyclists' preferred strategy. The AHP decision model in this study has three levels (Figure 1). The first level describes the goal of the analysis. The second level consists of the main decision criteria, those deemed crucial to the CTUs decision-making process: security (from theft), guarantee (bicycle will be available, not getting bumped), flexibility (ability to change plans as needed), and cost (to user). These characteristics were determined after conferring with colleagues in the transportation field at the University of Colorado, who played an advisory role. The third level consists of the four predominant integration strategies mentioned earlier: (*a*) bike on transit, (*b*) bike to transit, (*c*) shared bike, and (*d*) two bike.

The criteria weights, or relative weight that respondents assigned to each Level 2 criterion, capture the issues most critical to their decision-making process to prioritize the four integration strategies (Table 3). Individual criterion weights and the following overall performance weights are calculated by the principle eigenvector method, an application commonly used in science and engineering. More information on eigenvectors and the functionality of AHP in general is available in the literature and online software packages (*15*).

A closer look at the individual communities indicates that security ranges from a low of 0.189 in Boulder to 0.560 in Chicago. The high score in Chicago probably reflects the fear of bicycle theft, and the low score being relative safety associated with Boulder. Guarantee proved less critical, but it ranked especially high in Boulder, perhaps reflecting the need for a bicycle to cover a final mile in the relatively low-density community.

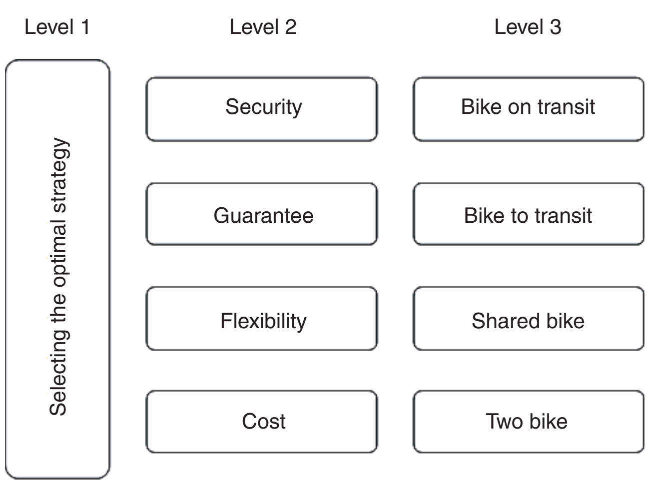

FIGURE 1 Analytic hierarchy schematic.

TABLE 3 Importance of Decision-Making Criteria for Four Integration Factors

Factor	Average	Range	SD
Security	0.347	0.189–0.560	0.135
Guarantee	0.278	0.152–0.342	0.082
Flexibility	0.210	0.188–0.426	0.041
Cost	0.082	0.152–0.342	0.010

NOTE: SD = standard deviation.

Consistency ratios show the logic of paired comparisons and level of uniformity of response (Table 4). If one prefers A over B, and B over C, then the individual should logically prefer A over C. Consistency ratios at 10% or below are considered acceptable as a rule of thumb; much beyond 10%, and results of paired comparisons become more random (*16*).

The ratios reflect consistency in responses averaged by a group with 26 of the 35 ratios within the 10% threshold. Several groups with ratios of up to 50% under the guarantee matrix would be worth further investigation, by looking at individual responses for common patterns.

Preferred Integration Strategies

Respondents most preferred the bike on transit integration strategy in six of the seven focus groups (Table 5). Bike to transit ranked just above bike on transit in Portland, and Santa Clara County residents only slightly preferred bike on transit over bike to transit.

Analysis of Cost-Effectiveness

Assessment of cost-effectiveness relied on three broad factors: (*a*) costs of different alternatives, (*b*) number of CTUs per unit, and (*c*) likely effectiveness of each alternative (a measure of the degree to which a common aim is reached). The aim could be measured by the number of travelers using transit with bicycle use at the access or egress location. Costs and number of CTUs accommodated per unit were gathered from contacting industry representatives. The focus groups gathered cyclists' preferences through stated-preference surveys, applied in the AHP process. Overall cost-effectiveness is calculated as the composite weight divided by the per CTU cost, or impact per dollar. Assessments of cost-effectiveness are replicated for all four strategies and for all seven focus groups.

FINDINGS

Contrary to cyclists' preferences for bike on transit, bike to transit proved most cost-effective on average when compared with the most common bike on transit configuration, that is, front-mounted bicycle racks on buses (Table 6). When calculated with bicycle racks in light rail transit vehicles, bike on transit was most cost-effective. In four

TABLE 4 Consistency Ratios of Analytic Hierarchy Process

	Consistency Ratio						
Factor	Chicago	Boulder County	City of Boulder	Ithaca 1	Ithaca 2	San Jose	Portland
Level 1 comparison: security, guarantee, flexibility, cost	0.01	0.09	0.12	0.12	0.01	0.12	0.10
Comparing integration strategies while thinking of Level 1 criteria							
Security	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Guarantee	0.05	0.50	0.19	0.07	0.22	0.03	0.05
Flexibility	0.02	0.05	0.05	0.12	0.05	0.09	0.05
Cost	0.04	0.04	0.05	0.10	0.11	0.01	0.10

TABLE 5 Priority of Integration Strategy by Focus Group

Integration Strategy	Boulder	Boulder County	Chicago	Ithaca 1	Ithaca 2	Portland	Santa Clara County	Average
Bike on transit	0.544	0.369	0.472	0.640	0.623	0.322	0.326	0.471
Bike to transit	0.129	0.209	0.127	0.114	0.184	0.324	0.211	0.185
Shared bike	0.206	0.231	0.273	0.134	0.096	0.124	0.229	0.185
Two bike	0.120	0.190	0.128	0.111	0.097	0.231	0.233	0.159

TABLE 6 Assessment of Cost-Effectiveness

Integration Strategy	Composite Weight	Cost ($)/CTU	Overall Score	Overall Ranking
Bike on transit (bike rack on light rail)	0.471	172	0.00273	(1)
Bike to transit	0.185	97	0.00191	1
Bike on transit (bike rack on bus)	0.471	323	0.00146	2
Two bike	0.159	194	0.00082	3
Shared bike	0.185	3,500	0.00005	4

of the seven focus group communities (city of Boulder, Chicago, Ithaca 1, and Ithaca 2), bike on transit is most cost-effective. Boulder County, Portland, and Santa Clara County preferred bike to transit. On average, two bike was the third most preferred integration strategy, with the exception of Portland, where it ranked second. The shared bike strategy was least preferred in all focus groups. Boulder County and Santa Clara County both heavily favored the security of bike on transit over bike to transit, whereas Portland considered bike to transit to be more secure. Concerns about unsecured bicycle parking were repeatedly expressed in focus group discussions, as was Portland's preference for bicycle lockers. These findings suggest that increasing the security of bicycle parking would make bike to transit more competitive.

CONCLUSIONS AND FURTHER REFINEMENTS

This research project conducted a preliminary cost-effectiveness assessment comprising costs and cyclists' preferences for each integration strategy. Preferences were gathered through stated-preference surveys from focus groups in five communities and calculated with the AHP, a multicriteria decision-making tool.

Results from the AHP, focus group discussions, and assessment of cost-effectiveness suggest disagreement between cyclists' general preferences and cost-effectiveness of the four integration strategies. Cyclists generally preferred bike on transit, whereas bike to transit proved most cost-effective for the most common bike on transit configuration, that is, front-mounted bicycle racks on buses. However, when cost-effectiveness was calculated with costs for a bicycle rack installed in a light rail vehicle, the findings favored bike on transit. This alternative does not consider the limited expansion capacity associated with bike on transit. The overall importance to which cyclists assigned security suggests considerable room for creative solutions to improving the favorability of the three additional strategies, thereby addressing some of the inherent capacity limitations of the most common strategy, bike on transit.

Although the cost-effectiveness measure does not suggest brilliant insights to address this challenge, it enhances understanding about increasing the cost-effectiveness of the three additional strategies. Much of the concern about the lesser-preferred options of (*a*) bike to transit, (*b*) shared bike, and (*c*) two bike strategies centers on security issues. Security ranked highest of the four factors, making up 35% of decisions on average (Table 3). Minor adjustments in security could address the challenge of capacity limitations for bike on transit and make the less cost-effective strategies comparable with bike on transit. Anecdotal responses from the focus group in Portland suggest that added security provided by bicycle lockers and the short egress distances increased the favorability of bike to transit. Exemplifying elasticity of the composite weight of bike to transit, for every 1% gain in security, the overall cyclist preference goes up by 0.8%.

This research revealed several examples of secure bicycle parking efforts. Chicago has built bicycle parking inside transit stations, and several communities have integrated bicycle lockers as part of their bicycle parking. Boulder County is developing bicycle corrals at transit access and egress points to increase transit ridership and reduce congestion on a state highway. The corrals will afford weather and security protection for 20 bicycles with smart card technology, without the cost, space, and "hostage-taking" concerns associated with bicycle lockers. The Boulder corrals represent an approach to provide an alternative to the capacity limitation in regard to bike on transit while addressing security and weather concerns associated with the other three strategies. The bicycle corral may be relevant to either a bike to transit or a shared bike strategy. New approaches such as these may help to overcome the apparent challenges of security that plague the three less-preferred strategies and help to increase bicycle and transit integration.

This study warrants future research into assessment of cost-effectiveness: conducting additional focus groups of beginner or potential cyclists, with additional strategies, and conducting focus groups of targeted cyclists who use secure bicycle parking facilities. Participants of focus groups tended to be very knowledgeable and experienced cyclists. Although the composition of focus groups helped in understanding the preferences of avid cyclists, the participants did not provide insight into the preferences of beginner or latent cyclists, in which considerable room for CTU growth exists.

Several follow-up questions might be explored at future focus groups. Although this research generally showed the preferences by cyclists for the bike on transit strategy, it did not specifically ask what it would take to make other alternatives more attractive. By secure bicycle parking, what do cyclists mean? Does it vary from big city to small town? How would improvements to the security of different strategies improve the overall effectiveness of that strategy?

Experience from the use of the AHP in the focus groups suggests that respondents experienced some difficulty in understanding the concepts. Guarantee was not always interpreted to mean that it varies across the four strategies, but rather that all four strategies were guaranteed to be available. Such mild confusion contributed to high consistency ratios on some occasions. Further research would be needed to understand significant differences in the responses by individuals, or if this was a result of a misunderstanding. Similarly, the majority of respondents considered the guarantee of bike on transit more favorably than expected, given the limited bicycle capacity on buses and likelihood of being bumped from transit.

Targeting cyclists who use secure parking constitutes a second area worth future research. Costs of different strategies may change, as may people's preferences. The two bike strategy, although the least preferred, could be enhanced through secured bicycle parking. Anecdotal evidence suggests that bicycle corrals that employ smart card technology and that offer protection from the weather and vandalism, could prove to be an effective, affordable way to integrate bicycles and transit. Finally, the research efforts did not systematically capture externalities of the local communities that might influence cyclists' preferences. As it is difficult to work with hypothetical options; once these strategies become better used, their impressions will be better formed. For instance, stated-preference surveys would be helpful with users of the Chicago indoor bicycle parking facilities or the forthcoming Boulder County bicycle corrals.

Much is to be gained from development of a variety of integration strategies for users as well as for communities. Gaining more insight into the formation of cyclists' preferences for integration strategies could yield larger gains in bicycle and transit integration levels and begin to address ongoing environmental, health, and congestion-mitigation concerns. For communities, gains could also reduce the need for automobile parking at park-and-ride lots.

ACKNOWLEDGMENTS

This research is supported by the Mineta Transportation Institute; the PhD program in Design and Planning at the University of Colorado, Denver; and the National Science Foundation's Integrative Graduate Education, Research, and Traineeship Program in Sustainable Urban Infrastructure.

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The Intermodal Transfer Facilities Committee peer-reviewed this paper.