Valuing Walking

Evaluating Improvements to the Public Realm

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Colin Buchanan and Accent MR

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Contents

Page

Abstract

Summary

This paper examines how pedestrians value the walking environment. It reports on stated preference research into walkway improvements and examines how benefits to users have been assessed for a number of walking projects.

Abstract

The economic appraisal of walking schemes is still in its infancy, but the science of quantifying how pedestrians value the walking environment is developing quickly. The authors previously carried out an economic evaluation of improvements to London's Strategic Walks that included quantitative measures of some of the health, safety, environment and quality benefits that accrue to pedestrians. This paper focuses on the evaluation of quality benefits, which represent some of the most important reasons for funding and justifying improvements to the walking environment.

The Strategic Walk Network comprises six core paths, totalling 533km and crossing all 33 London boroughs. The routes are the London Loop, Capital Ring, Thames Path, Jubilee Walkway, South East London Green Chain and the Lea Valley Walk. The paths range from rural trails around the edge of London to teeming city streets that feature some of the capital's most popular attractions. The Strategic Walks have been designed and managed as flagship projects with the intention of addressing traditional deterrents to walking and demonstrating best practice in footway management.

The managers of the Strategic Walk Network commissioned Colin Buchanan and Accent

MR to improve the accuracy of assessing the value of walks through stated preference surveys. On London's Jubilee Walkway, Thames Path and Capital Ring, 700 surveys have been carried out to determine how improvements to the pedestrian environment are valued.

The purpose of applying economics to the measurement of pedestrian benefits is to focus the attention of officials, designers and policymakers on the quantum of benefits that accrue to users and where those benefits are generated. Benefits may vary not only by improvement, but by user type, pedestrian environment and by familiarity with the walkway. As a result, we distinguish between 'striders', that is, users who walk with a clear destination and prefer time savings to quality improvements, and 'strollers', that is, users who may not have a clear destination and who prefer quality improvements to time savings. We also distinguish between built-up environments in predominantly urban locations, and green/open environments that are away from high streets. Thus, provision such as benches that may be valued highly in green areas may have a negative value in urban areas where they can prove to be clutter. The surveys have been carried out among users and non-users, and for work trips, shopping trips, personal business trips and pleasure walks, both in built and open environments. This approach will determine therefore how benefits vary by journey purpose, location and built environment.
This paper describes the findings from these surveys. It shows how interviewees value benches, signs, information panels, crowding, evenness of pavements, kerbs, street lighting, street clutter and cleanliness along walkways.

This research has potentially important implications for the funding of walking improvements. In the UK, where formal appraisal is expected of transport schemes, the funding of walking improvements may be held back by the inability to measure quality

improvements in a quantitative fashion. Whereas hard modes have included quality benefits in transport appraisals for some time, walk schemes have not been able to do this despite the fact that their advantage is in the provision of quality. As walking schemes in the UK move towards systems of quantitative assessment, these findings provide important evidence on the benefit of walking schemes and they may help to redress the balance between ‘soft’ and ‘hard’ modes and increase the funding available for walking schemes.

1. Introduction

1.1 The importance of walking

1.1.1 Walking accounts for about a quarter of all journeys in the UK. Moreover, walking accounts for an element of all public transport journeys. In a year, people walk almost as far as they travel by bus and over three times as much as they travel by Underground and light rail.

1.1.2 Encouraging walking is key to delivering sustainable transport solutions. Walking and cycling are the only transport modes that have positive externalities, i.e. their use has benefits for society. Walking reduces traffic; is good for health; lowers crime; revitalises town centres and improves air quality.

1.2 Evaluating Walking

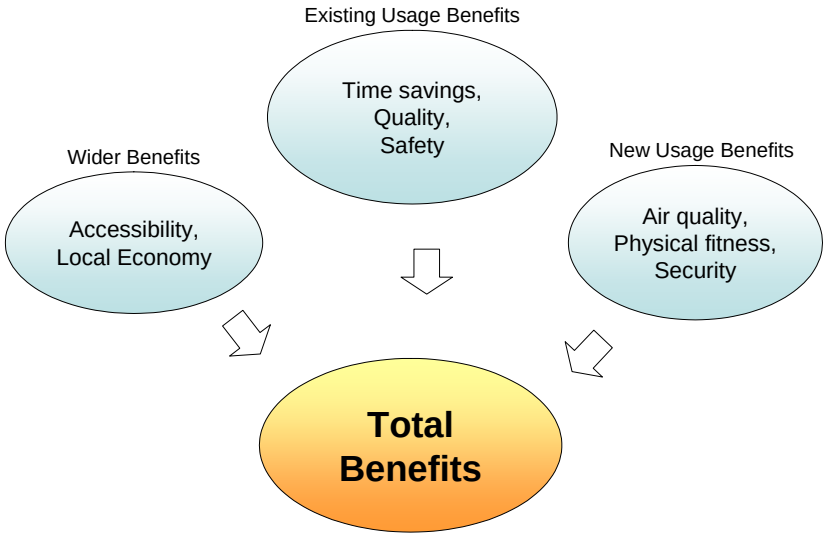
1.2.1 Despite the importance of encouraging walking, the funding received by walking projects is dwarfed by expenditure on hard modes such as road and rail. Walking projects receive only about 2% of capital spend among London boroughs.

1.2.2 One reason why rail, bus and highway infrastructure projects receive so much more funding in the UK is that there are established methods of evaluation to measure their economic impacts. Over the course of forty years, appraisal systems have been developed on how to measure the costs and benefits of road and public transport schemes. These appraisals allow hard modes to quantitatively demonstrate benefits and value for money. However, these systems are not well suited to measuring the benefits of walking.

1.2.3 In the economic evaluation of walking schemes, benefits have traditionally been measured by valuing time savings and safety at road crossings. The measurement of time savings can be applied to evaluating new routes, short cuts or the phasing of pedestrian signals. Evaluating safety at road crossings involves measuring the cost of accidents and is an important element in demonstrating the need for safe crossings.

1.2.4 However, assessing time savings and safety alone does not capture the wide ranging benefits that walking projects offer. There are a wide range of other benefits that need to be quantified and assessed in order to demonstrate value for money in the same way as can be determined for hard modes. These benefits are shown in Figure 1.

FIGURE 1 : BENEFITS OF INVESTMENT IN THE WALKING ENVIRONMENT



1.2.5 Even though the benefits of walking identified in Figure 1 are widely known, there is no established way to measure the extent to which economic returns exceed (or fail to meet) economic costs for the majority of these benefits.

1.2.6 As a result, there has been interest in quantification and valuation of a wider range of benefits. The DfT are putting together guidelines for the appraisal of walking schemes that may enable inclusion of physical fitness and environmental impacts to complement the traditional focus on time savings and safety. This approach has the potential to enable walking projects to prove their economic benefits to decision makers and therefore win more funding. The DfT guidelines will encourage walking projects to conduct evaluations and better enable 'soft' modes to compete for limited resources.

1.2.7 However, even with quantification of physical fitness and environmental benefits, many schemes will still be unable to demonstrate the wide ranging benefits that they offer. The only way for walking projects to affect physical fitness or health is to switch people from other modes to walking or encourage them to make new trips on foot. Expenditure on walking does both, but we do not yet understand the effect well enough to measure it.

1.2.8 In fact, the majority of expenditure on walking is not to generate physical fitness, environmental impacts or time savings. The bulk of expenditure that does not relate to safety, new users or economic benefits, is spent on improving the quality of the walking experience. Improving quality is about improving the walking experience for existing users. The removal of street clutter in Kensington and Chelsea, the World Squares Initiative, including the partial pedestrianisation of Trafalgar Square and other high profile projects have been designed with the purpose of improving conditions for existing users as a major objective.

1.2.9 Walking projects and improvements to the public realm provide quality improvements and it is important to be able to demonstrate this quantitatively. At present, quality benefits (comfort and security) are included in evaluations of rail and bus schemes but not for walking. This leads to the rather bizarre situation in which, benches at London bus stops, signs in Underground stations and crowding on National Rail are all quantified and valued in appraisals. However, neither benches, nor signs nor crowding are valued for walkways.

1.2.10 In order to determine whether it is possible to value improvements to the walking environment, the Corporation of London recently commissioned Colin Buchanan to assess willingness to pay for such improvements on the Strategic Walk Network.

2. Methodology

2.1 Stated Preference Research

2.1.1 Since walking is a public good, there is no fee for the quality of experience that users obtain from making use of the public realm. However, users clearly do value the public realm and were it feasible (or sensible) to charge for it then users would be willing to pay for improvements.

2.1.2 Stated preference techniques offer a means to assess that willingness to pay. Stated preference research can be used to determine the key factors in the choice between competing products or services and measure the relative importance of these factors. It is an established technique for assessing the value of quality improvements.

2.1.3 TfL have used stated preference research to determine values for improvements for users of London Underground and London Buses, assessing aspects such as lighting, signing, seating, information provision, noise, etc. More recently, stated preference methodologies have been applied to the walking environment in studies by CREAM and ITS.[1]

2.1.4 In order to apply stated preference analysis to enhancements to the pedestrian environment, it is important to recognise that the value that users place on improvements could vary depending on the user/journey and on the environment/context at the location. For instance, someone travelling to work may place less importance on a nice environment than someone walking for pleasure. Someone walking in a park might value improvements in a different way to someone walking through a residential area.

2.1.5 The aims of the stated preference research were:

- to assess whether pedestrians value quality improvements;
- to determine if stated preference techniques could be used to ascertain willingness to pay; and
- to assess whether the values that users attach to improvements varies between locations, different user and non-user groups.

2.1.6 The methodology outlines:

- the selection of user groups;
- the choice of sample sites; and

[1] Willis, K.G., Powe, N.A. and Garrod, G.D, Valuing the benefits of improved street lighting in rural areas, Report to Department for Transport, Centre for Research in Environmental Appraisal & Management, University of Newcastle upon Tyne (2003).
Tight, M., Hodgson, F. and Page, M., Measuring Pedestrian Accessibility, Final Report for EPSRC Project GR/R18543/01 (2004).

- the selection of improvements.

2.2 User Groups

2.2.1 In order to assess the different way in which users value quality, we previously distinguished between two types of pedestrian: 'striders' and 'strollers'. The strider prioritises time savings over the quality of the walk, the stroller prefers a nice environment and is unconcerned with the time it takes to reach a destination (there may not even be a destination). People concerned with reaching a destination quickly (striders) will value certain improvements less than people who are walking for pleasure (strollers).

2.2.2 Striders and strollers as categories are conceptually simple. However, these concepts may not adequately capture the differences between users in terms of preferences, since many lie in between these extremes. For example, someone on a shopping trip may value both quality and time savings. Even those on journeys associated with time savings, i.e. commuting, may favour some quality provision (those who choose to take the 'scenic route' to work). Moreover, the National Travel Survey does not collect journey purpose information using these definitions. As a result, user categories were chosen in order to reflect the variety of different preferences for the journey purpose categories identified in transportation statistics. The categories were:

- Pleasure users: walking solely for the pleasure of going for a walk (including dog walkers) or with pleasure as a stated element of their journey purpose
- Shopping users: walking as part of a shopping or personal business trip
- Leisure users: walking to or from a leisure trip destination or visiting friends or relatives
- Commuters: walking as part of the trip to or from work or in work time.
- Non-users: those living within 20 minutes walking distance of the survey site, but visiting it less often than once every three months.

2.3 Site selection

2.3.1 There are a great range of walking environments and the expectation and valuation of pedestrian facilities may depend on environmental context as well as the user. For example, street lighting may be valued very highly among users of inner-city footpaths; however, it may detract from the walking experience on a scenic footpath. The way in which pedestrians value improvements is therefore likely to depend on the environment around the walkway. There are infinite variations among walking environments. For simplicity, these environments have been split into two: built and open. A 'built' walking environment refers to walkways that run next to commercial, residential or industrial land. An 'open' walking environment encompasses

rural and urban fringe paths, urban parks, and riverside paths. These categories are a simplification that allow us to test whether preferences vary by environment.

2.3.2 In order to select built and open sites, locations were chosen to satisfy a number of conditions. These included:

- mixed purpose/use (including during winter months);
- sufficient volumes to achieve successful recruitment; and
- existing levels of provision that are representative (neither too good nor too bad).

2.3.3 A section of both the Capital Ring and the Thames Path at Richmond was chosen as an open site. Non-users for this site were recruited in Richmond town centre. A section of the Jubilee Walkway on Fleet Street was chosen as the built site, and non-users were recruited around Holborn.

2.4 Improvements

2.4.1 In their analysis of factors influencing pedestrian accessibility, Leeds ITS (2004) found the following factors to be potentially the most important:

- Levels of street lighting;
- Number of roads crossed along a route;
- Frequency of detours along a route;
- Widths of footways;
- Evenness of pavements;
- Speed of traffic;
- Volume of traffic;
- Number of cyclists encountered; and
- Cleanliness of pavements.

2.4.2 For the assessment here, the measures assessed were chosen to cover as many of these as possible while maintaining a focus on the expenditure of the Strategic Walks. The following categories of improvement have been assessed:

- Street lighting;

- Crowding;
- Kerb level;
- Information panels;
- Pavement evenness;
- Directional signage;
- Bench provision; and
- Cleanliness.

2.4.3 Within these categories, different levels of provision have been assessed wherever the pilot survey indicated that a finer level of detail would be understood by respondents. The variables and exact levels of provision used in the exercises are presented in Table 1.

Table 1 : Variables and levels for SP exercises

Variables	Levels
Street lighting	• Pavement badly lit • Pavement well lit
Walking space[1]	• Pavement 50% crowded • Pavement 25% crowded • Pavement 0% crowded
Kerb level	• Step up/down from kerbs to crossings • Slopes at crossings (for pushchairs/luggage) • Raised street at crossings (gives more priority to pedestrians at crossings)
Information panels	• No info panels • Info panels with details of maps & attractions
Pavement evenness[1]	• Pavement 50% uneven • Pavement 20% uneven • Pavement 10% uneven • Pavement 0% uneven
Directional signage	• No directional signs • Directional signs to attractions & leisure walks • Directional signs to transport interchanges
Bench provision	• No benches • Benches provided
Cleanliness[1]	• Pavement 100% unclean • Pavement 50% unclean • Pavement 25% unclean • Pavement 0% unclean

[1] The use of percentages to define these categories is based on a method used by ITS. It proved to be more successful than alternatives when tested in the pilot survey since respondents found it easy to understand the levels. It is also a useful method for obtaining intermediate values.

2.5 Recruitment

2.5.1 A sample of 100 respondents was sought in each of the groups. Respondents were recruited at the survey sites where a recruitment questionnaire was used to determine whether or not people in the areas surveyed were in-scope for the study. They were then handed the show material needed for the main interview. This interview was conducted by telephone at a time more convenient to the respondents.

2.6 Surveys

2.6.1 Surveys assessed relative preferences separately to valuations. Although stated preference is often used to establish monetary valuations directly, this was not done in this study because of the large number of attributes being tested. Instead, surveys established monetary valuations using a three part methodology: stated preference, contingent valuation and apportioning exercises.

2.6.2 Stated preference was used to determine the relative strength of preference between benefits. This involved presenting respondents with pairwise choices between different specifications of improvement. Respondents' choices between these packages provide the data to make the analyses of relative preference.

2.6.3 A contingent valuation exercise asked a series of transfer pricing questions in order to determine how much respondents were willing to accept having only the base levels instead of having the highest levels for all variables together. A tax rebate was used in order to ensure comparability with results from previous studies.

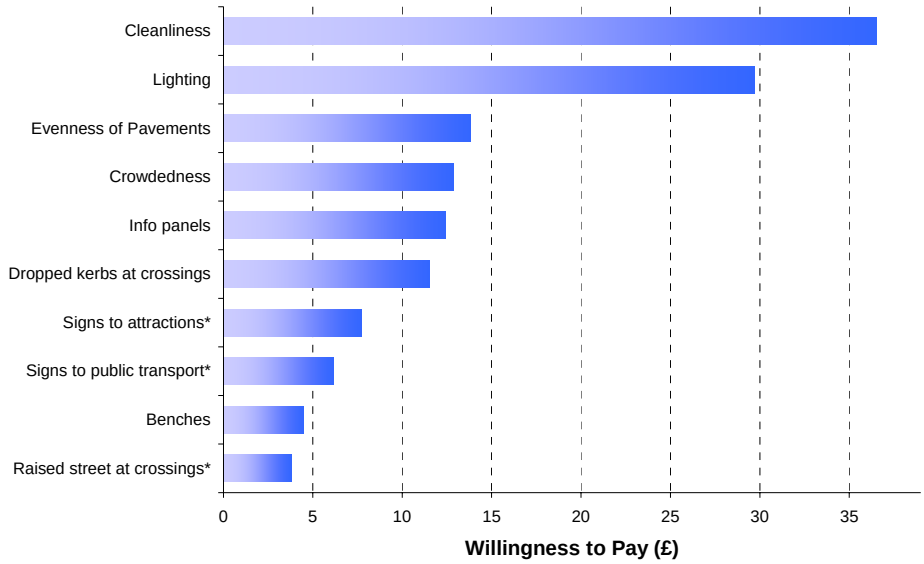
2.6.4 To apportion benefits, a final costing question was used to determine what proportions of tax rebates should be apportioned to the variables presented in the stated preference exercise.

3. Results

3.1 Findings

3.1.1 The results show that pedestrians are willing to pay for improvements to the areas that they use. The values for improving street lighting, crowding, kerb level, information panels, pavement evenness, directional signage, bench provision and cleanliness were most frequently between £50 and £100. The mean total willingness to pay for the combined series of measures was £119. It is apparent that were it practical or feasible for users to pay for improvements to walkways then they would be willing to do so, as shown in Figure 1.

FIGURE 1 : WILLINGNESS TO PAY FOR IMPROVEMENTS (ALL RESPONDENTS)

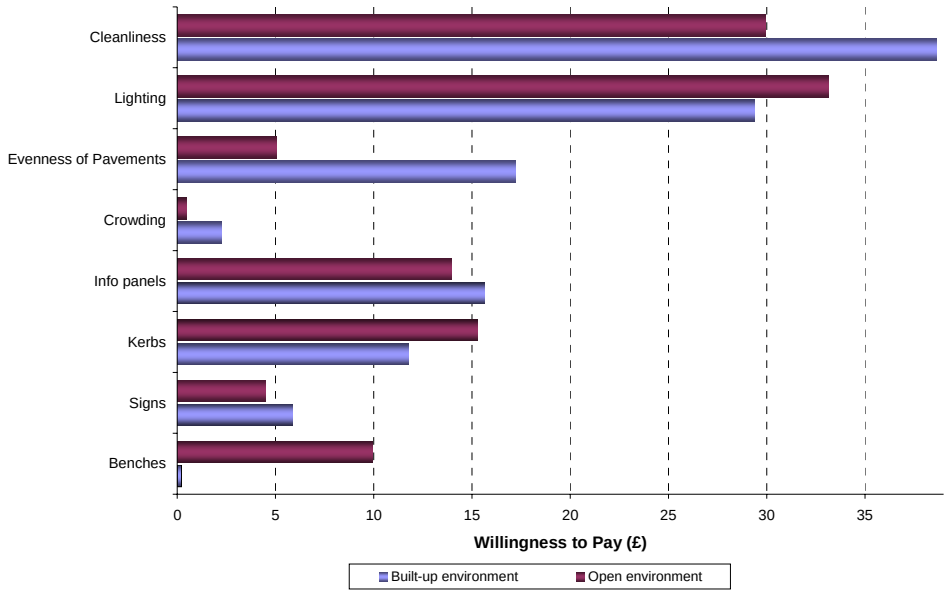


** There is reason to believe that this result offers only a partial valuation*

3.2 User Groups

3.2.1 The stated preference research determined values that suggest significant differences between sample groups. Values vary by context, by journey purpose and whether respondents were users or non-users. Without a doubt, the most important of these differences was variation by environment. The study assessed just two categories, 'built' and 'open', and found that the values place on improvements varied a great deal between them due to the different expectations/preferences that users have in different environments. Figure 2 shows how values vary by location.

FIGURE 2 : WILLINGNESS TO PAY BY LOCATION



3.2.2 There were also some significant differences by journey purpose. These were found to exist for a number of improvements, and the results moved in line with expectations. Nonetheless, the results show that users walking with an element of pleasure in their journey purpose appear to attach a relatively small premium to improvements. For reasons of simplicity, ease of data collection and ease of further research, this difference is not considered to be important.

3.2.3 The tests of non-users did show some significant differences when compared with users. However, without a greater understanding of trip generation factors, these results cannot be usefully applied.

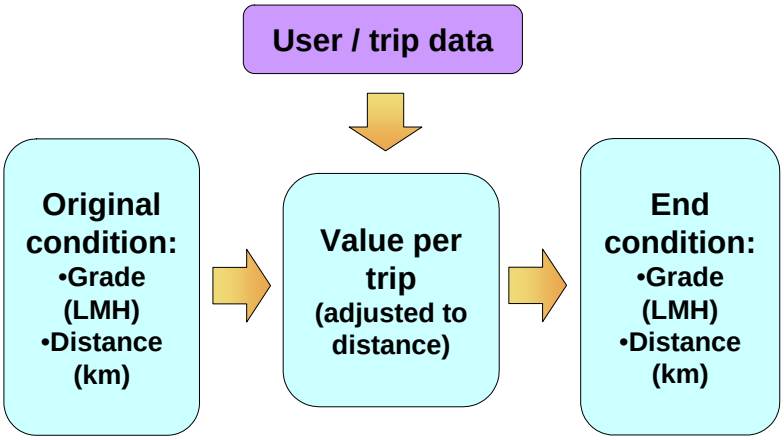
3.3 Using values in appraisals

3.3.1 These results can be used as a measure of WTP. In order to establish values that can be used in the appraisal of schemes, it is necessary to adjust the initial values such that they represent the value to users of quality improvements on any given journey. This requires adjustment for:

- User groups and locations;
- Trip frequency;
- Length of the study area;
- Converting one-off payments to repeated journeys;
- Measuring changes in the level of provision; and
- Present value.

3.3.2 Figure 3 shows how the adjusted values are then applied to a walking project in order to determine quality benefits

FIGURE 3 : APPLICATION OF THE WTP VALUES



4. Evaluating Schemes

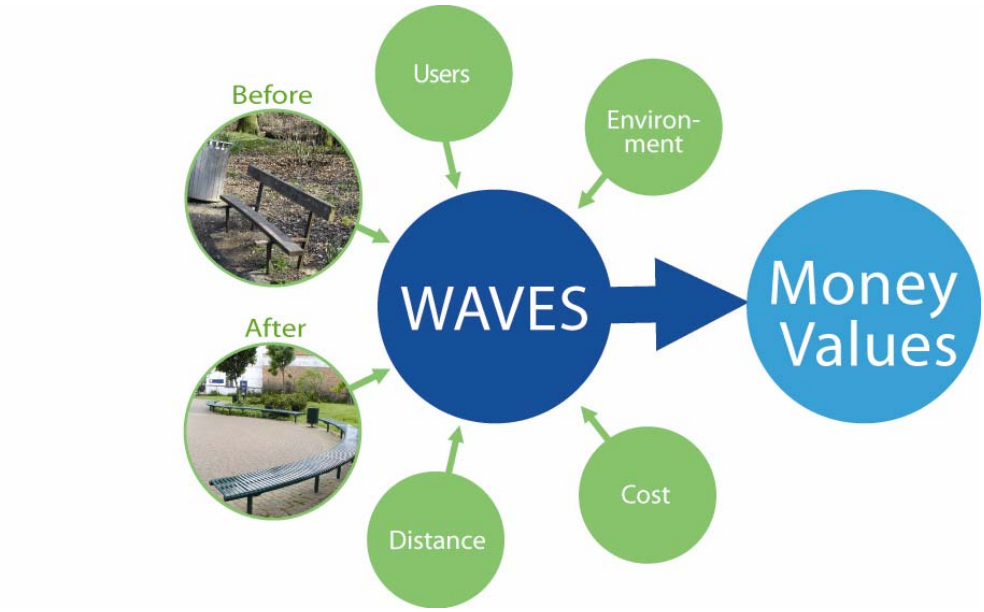
4.1 Applying the values

4.1.1 The findings of this research have been applied to a number of schemes around the country. They have been used to assess rural areas, in an examination of £10m of proposed improvements to the National Trails in England. They have been used to assess £12m of improvements in London along the Strategic Walks. In addition, they have recently been used in an assessment of a number of schemes in order to support Transport for London's business case.

4.1.2 The findings of this research have been incorporated into WAVES, a model developed by Colin Buchanan to place money values on quality benefits for walkways. WAVES can determine the economic returns of investment in walking for urban, fringe and rural areas around the country. It assesses investment in walkways based on user numbers, proposed improvements and the characteristics of the locations.

4.1.3 WAVES calculates the benefit for each improvement separately. The evaluation of each improvement makes use of the inputs shown in Figure 4

FIGURE 4 : WAVES INPUTS



4.1.4 The importance of applying this research in this way is clear. It enables walking schemes to:

- Demonstrate value for money; and
- Prioritise expenditure.

4.1.5 As a result, the research can assist walking projects by helping them to procure funding. The case study below shows how this was carried out for the 2005 bid for funding for London's Strategic Walks.

4.2 Case Study: The Strategic Walks

4.2.1 The proposed improvements assessed on the Strategic Walks include over 450 site-specific measures. As a result, the economic evaluation of each improvement is based on the best available information, as shown in Table 1.

TABLE 2 : WAVES Inputs for the Strategic Walks

Users	▪ For each improvement proposed, route managers estimated usage as high, medium or low. ▪ Manual counts were carried out at representative high, medium and low sites to estimate user numbers at each one.
Environment	▪ Values applied depend on the environmental context, and WAVES divides environments into two types: 'built' and 'open'. ▪ 'Built' walking environments include commercial and residential land. 'Open' include rural trails, urban parks, and riverside paths.
Distance	▪ The benefit of an improvement is related to the length of walkway that is improved. ▪ The method of calculating distance varies by measure.
Before and after condition (extent of improvement)	▪ The benefit of an improvement depends on the base condition. ▪ To measure the extent of the improvement, start and end conditions are classified as poor, medium or good.
Cost	▪ Cost information has been obtained from local authorities, and known unit costs have also been used

4.2.2 These techniques for calculation make it possible to appraise each proposed improvement individually such that the benefit takes account of usage, environmental context, distance affected and the initial condition.

4.2.3 WAVES measures both absolute and relative returns from investment in walking. The most powerful output from WAVES is the prioritisation of schemes to show best value for money.

4.2.4 Table 2 provides an aggregation of the results by measure.

TABLE 3 : Benefit-Cost Ratios by Measure

Measure	Total Cost (£000)	Benefit per km walked (£)	Total Benefit (£000)	Benefit-Cost Ratio
Benches	320	0.005	3,290	10.3
Crowding	380	0.017	270	0.7
Evenness	3,450	0.008	1,000	0.3
Kerbs	1,590	0.024	3,360	2.1
Lighting	680	0.034	2,240	3.3
Signs	680	0.005	1,110	1.6
Info panels	270	0.008	3,520	13.3
Total	**7,370**	**0.011**	**14,790**	**2.0**

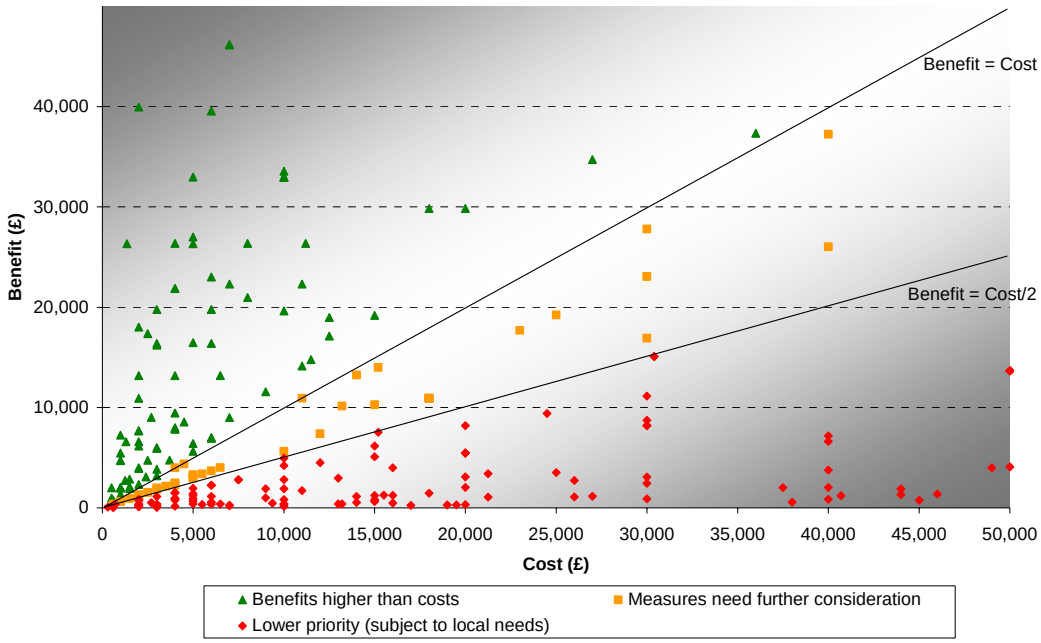
4.2.5 The results show that, at an aggregate level, expenditure on benches and information panels on the Strategic Walks gives the highest benefit-cost ratio (BCR). Typically these schemes are inexpensive in comparison to larger pedestrian infrastructure measures, yet they are appreciated by users and hence produce relatively high benefits.

4.2.6 This does not mean that funding should be allocated solely to benches and information panels just because they show the highest BCR. Since the tables above are aggregated, they do not show the prioritisation that can take place. Looking at the full results on a **site by site basis** shows that spreading investment between the highest returns for **each** measure will increase overall benefits.

4.2.7 The full optimisation of expenditure between all proposed improvements is shown in Figure 4. Each improvement has been assigned a colour:

- Green schemes have a willingness to pay among users that is greater than cost.
- Amber schemes have a willingness to pay that is lower than cost. Given uncertainty, these schemes may in fact demonstrate returns above costs.
- Red schemes offer economic returns that are less than half of the cost. These may be worthwhile investments. However, analysis of willingness to pay suggests that other aspects will have to be considered in order to justify expenditure on these projects.

FIGURE 5 : BENEFITS AND COSTS FOR ALL PROPOSED IMPROVEMENTS



4.2.8 The site by site analysis shows that on the Strategic Walks, relatively inexpensive schemes (especially benches and information panels) show the highest benefits. The more expensive schemes (often involving surface improvements) tend to be justified where usage is high. However, even where these do not appear to be justified, it should be kept in mind that they also improve accessibility, a benefit that has not been included in the evaluation.

4.2.9 Although there are a number of measures and benefits not included in the analysis, evaluation with WAVES suggests that a robust case can be made for investment in the Strategic Walk Network. An examination of improvements with a focus on users shows that there are significant returns to funding walkways.

5. Conclusion

5.1 Valuing Walking

5.1.1 Stated preference research has shown that pedestrians do value improvements to the walking environment in their local area. The values determined for appraisals correspond well with previous attempts to quantify willingness to pay for pedestrian improvements. They are similar, though noticeably lower, than values determined for improvements to London Underground. Together, this suggests that stated preference is a viable and effective means to assess improvements to pedestrian environments.

5.1.2 The appraisal methodology developed for walking has been applied in a number of locations. The results show that proposed expenditure offers significant economic returns. They show that there may be a great deal of benefit from investment in walking projects. Even an incomplete valuation that does not include safety, health or environmental benefits suggests that returns can exceed costs.

5.1.3 The success of this approach is an achievement in the appraisal of walking because it offers a method of evaluation that has the potential for future application. Even though the appraisal of walking is only in its infancy, this first step shows that evaluations can demonstrate benefits and therefore prioritise projects more effectively and ensure appropriate funding for walking schemes.

5.2 Further Research

5.2.1 The appraisal of walking schemes has not had the time or investment that appraisal methods for other modes has had. As a result, the evaluation method proposed here does not cover a wide variety of investment in the walking environment. In order to improve this, research should be focussed on the elements of walking projects that require the most funding, in particular, on elements of expenditure that relate to the interaction of vehicles and pedestrians (which was outside the remit of the Strategic Walks) .

5.2.2 Areas for further research include:

- A more stratified concept of location that takes account of more variety than ‘built’ and ‘open’;
- A better understanding of how the removal of clutter is valued and how this relates to provision;
- A better understanding of how levels of crowding relate to security benefits;
- An understanding of the link between investment in infrastructure and trip generation; and

- The need to value measure such as segregation, the removal of guard-rails, reductions in vehicle noise/speeds/volumes, improvement of store frontages, renovation or replacement of pedestrian subways, street art and the impact of part-pedestrianisation.