

Rationalisation of urban bus services: the passenger response

Elizabeth Ampt
Director
Ampt Applied Research

Lyall Kennedy
General Manager
South & West Division
State Transit Authority NSW

Abstract:

A common issue faced by urban bus operators is the need to rationalise bus services - often meaning the increase of service levels in one area at the expense of services in another.

When the State Transit Authority of N.S.W. had to address this problem in 1989, a new strategy was developed. It was aimed at simultaneously testing the effect of the removal of the existing service, and the ease with which a transfer to alternative service/s could be made. One of the most interesting features of the approach was a method which incorporated actually working through the timetable/s for the modified services with bus users. This was done for all purposes for which the bus was currently being used by that person.

In general, it was found that the "rationalised" service did not have major disadvantages to current users, and the changes were implemented as planned. In several individual cases, where severe difficulties would have been experienced, it was determined that a taxi subsidy was applicable. And in one case the decision to remove the service was reviewed in the light of the results of the research and a service was reinstated.

It has been found that the method presented in this paper offers a superior alternative to existing methods of introducing bus rationalisation measures to passengers.

This paper also discusses research which has developed out of this method leading to customer perceptions of service reviews.

Contact author:

Liz Ampt
338 Spinks Road
Glossodia NSW 2756
Telephone: (045) 76 5573

Fax: (045) 76 5549

Introduction

The State Transit Authority (STA) of N.S.W. has implemented various changes to the bus network over the last year which have been designed to rationalise the services, at the same time providing a better service to the travelling public. In most of these instances, studies on the impact of the changes have been carried out. These studies have been designed to be sensitive to the customers and to monitor the changes from their perspective. This paper describes these studies.

When the study was first conceived, it was essentially targeted at the dissatisfaction which the STA felt would be encountered with the decrease in service levels in some areas. To this end, public meetings were considered since, it was argued, the antagonists of the changes would have a chance to air their views. This method was rejected at an early stage, however, for several reasons:

- o public meetings gather a very biased sample of views, not necessarily those of the needy.
- o the sample of people at the meeting could represent both users and non-users. While this is not inherently bad, it was not the purpose of the study to get reactions from non-users of the bus system at this stage.

For these reasons, the study approach outlined below was adopted

The Study Design

Objectives

The principal objective of the study was:

- o to assess the impact of the timetable/route changes in the affected areas by concentrating on the specific sub-areas where most 'disadvantage' was likely to occur, e.g. where the distance to a bus stop was actually increased.

More specifically, the study was designed to reach a high proportion of those people currently using the service and:

- o to **check** if there was anyone for whom the changes presented severe difficulties, in particular anyone for whom the trip would no longer be possible, and
- o to **inform** users of how the changes would affect them for all travel currently done by bus.

The Methodology

As noted earlier, the target population was made up of those people who used the bus stops to which changes would occur. This consisted of those people boarding and alighting at between the 3 and 6 stops which were affected per changed service. A four stage approach was adopted.

Stage 1

The aim of the first stage was to identify the target population, i.e. the people using the stops. To this end a questionnaire was distributed to all persons 15 years of age and over getting on or off the bus at the target stops on about 60% of the services affected by the changes. Since the questionnaires were very short (and respondents were provided with pencils) in almost all cases they were collected by the surveyor before passengers alighted from the bus. There was, of course, provision for them to be returned by mail -- mainly used by passengers on busy peak services.

The questionnaire was printed on an A4 sheet of stiff card in 2 colours. This made it look attractive, thereby encouraging good response rates, and making it easy to complete on-board the buses. Stapled to the front of each questionnaire were very brief instructions on how to complete the form. On the back of this (thin) sheet, there was a letter from the appropriate STA manager, legitimising the survey and providing a point of reference for any questions.

The questionnaire was designed to gain two specific types of information:

- o details of the specific trip being made (origin, destination, purpose, time of day), and
- o the home address of the passenger.

Details of the trip were important, since they formed the basis of the Stage 2 interview in which changes to the **specific trip** were studied. The home address of the passenger made it possible for an interviewer to call at the household shortly (1-3 days) after the onboard survey to carry out the Stage 2 interview.

The on-board surveys usually took place about a week or two prior to the introduction of the changes. Initially this proximity of the survey to the service rationalisations was dictated by the political necessity to address the issue in the shortest time possible. The timing was retained as part of the survey method, in subsequent studies, however, because of its perceived benefits. In particular, the on-board interviews, followed closely by the home interviews and the distribution of timetables (Stages 2 and 3) supported the impression that the STA was genuine in its intent to inform and assist rather than to railroad unconsidered changes. Although it was not

Amp, Kennedy

intended as an image-enhancing exercise, there is no doubt that, since in some cases (see Section 4) modifications to the changes were actually implemented based on the surveys, that there were many cases where the overall impression of the State Transit Authority would have been made more positive due to its assistance in one way or another.

Stage 2

In the second stage, personal interviews were carried out with a sample of bus users in each area. This took the form of a face-to-face interview conducted at the home of the bus traveller.

The interviewer used a structured questionnaire which did the following:

- 1) it obtained further details of the target trip (including time of departure from origin, time of arrival at the bus stop, time of departure from the bus stop, any time constraints to the travel [e.g. have to be at work at 9.00 a.m.]).
- 2) it obtained details of the return trip (or its "mirror image", if appropriate),
- 3) it gave an explanation of the timetable or route changes and their implications,
- 4) it gathered details of what would be done by the respondent to make that trip under the changed conditions [in terms of the factors outlined in 1) above]
- 5) it obtained details of the impacts (i.e. how respondents would travel) under the changed conditions for any other trip purposes made by them
- 6) it gained a general measure of satisfaction to the new timetable or route using a 5-point scale.

In explaining the changes and their implications, interviewers used the old and new timetables as well as detailed maps of the area to detail changes to bus stops and timetables. The respondents were asked to estimate new "origin departure" times and new bus stop access times. These were added to the timetabled in-vehicle times and the existing egress walk times to impute a total trip time (and any changes) as well as changes in departure/arrival times.

Stage 3

The weekdays prior to the introduction of the changes, timetables (and a pamphlet

explaining the changes) were hand-delivered to all households within walking distance of the affected bus stops. This was in addition to publishing changes in local and city-wide newspapers.

Stage 4

About 4 weeks after the introduction of the changes, all persons who were personally interviewed in Stage 2 were contacted again (personally) and details of their travel were obtained for the same trip purpose and time of as the original target trip.

The interviewer began by describing the target trip and asking if they had made the same trip (in terms of origin, destination and approximate time of day) since that time. If there had been no trip since the changes had been introduced, respondents were asked a series of questions about the reasons for this.

If there had been another trip/s, details of the most recent one were recorded and each component of the trip was compared with the way in which it would have been made prior to the changes. As in the Phase 2 survey, this was done for the return or mirror-image trip as well as for any other trip purposes.

All respondents were asked about any behavioural changes and the reasons for those changes. Finally, their overall reaction, again using a five point scale, was used to determine any perceptual differences since the service changes.

Impact of the Changes

In making an assessment as to whether the rationalisations should be implemented, there were clearly many elements to consider. The initial consideration, as described earlier, was of course, supply-driven: the services were not carrying "enough"¹ passengers and the vehicles could be used on runs experiencing over-crowding. This study, on the other hand, was designed to get an indication of the characteristics on the demand-side of the equation. Who will be affected, and how? This required a two-pronged approach: first an analysis of what is actually happening, and then a review of what kinds of people/trips would be most affected.

Analysis of Impacts

The first type of analysis took the form of determining the degree of impact on passengers in terms of whether they were:

¹ While the STA has no formal service standards relating to bus occupancy, in practice it is considered that loadings less than 10 in the off-peak require review.

Ampt, Kennedy

- o not affected at all, or the situation was better
- o subject to "minor" disadvantages (relating to travel time)
- o subject to "major" disadvantages (e.g. less frequent travel, new destination, change of a regular appointment)
- o unable to make the trip

It was interesting to note that in all areas there was a percentage (up to 20%) of people for whom the changes actually represented an improvement in the service level. In fact, in one or two cases, the explanation of the timetables actually showed respondents that having travel by an alternate (existing) bus route was better than the currently chosen option. One respondent (who had chosen the route because of the closeness of the bus stop) was actually able to leave home slightly later and arrive home slightly earlier, despite the additional walk time.

People were categorised as being affected in a "minor" way if only their total travel time was increased. Since the nature of the rationalisation meant that the level of service was being decreased, it was expected that a majority of people were affected in this way to some extent.

The third category was of those people who were affected to the extent of having decided to travel less frequently or to carry out activities at different destinations.

Finally there were those people who no longer made the trip. These fell into 2 categories: those who made had made it as a "once-off" type trip and who "wouldn't bother" if the conditions had not made it very easy, and those who would have been seriously disadvantaged after the changes.

Who was being affected

For each of the studies, it was comparatively straightforward to document and tabulate the above factors. From the tables which resulted, it was comparatively easy to conclude that if any person was no longer able to make some type of *obligatory* trip after the changes, there was (at a minimum) a need to investigate. But there is a relatively sizeable body of evidence to suggest that exactly the same service changes affect different people and trip purposes in different ways.

For example, U K. evidence (Hopkin, Jones and Stokes, 1988) suggests that while commuters find getting to work on time the most important attribute of a bus service, the disabled and elderly consider security, ease of access, and comfort much more relevant. Another issue relevant to the changes here is that of the effect of increasing walk times (e.g. Appleby, 1985). Once again it was shown that older or disabled people are much more sensitive to increased walk times than are younger or able-bodied people.

For this reason, further analysis took into account a *de facto* needs-based evaluation by examining the proportion of older or disabled people using the services.

A good example of the influence of an aged population occurred when changes were made simultaneously to an area in Bellevue Hill and Chifley. The Bellevue Hill change removed a peaks-only service used primarily for the journey to work by people between the ages of 20-40 years. The Chifley rationalisation was to remove an off-peak deviation into a street where users were almost solely over 60 years. Both changes meant that passengers would have to walk a similar extra distance, but while it caused considerable hardship for many older travellers in Chifley, it was generally considered (after the changes) insignificant by the Bellevue Hill travellers. [Indeed, after it was explained, one respondent praised the business-like attitude of the STA in rationalising the service.]

Results of the Study

Using the first type of analysis, it was decided to deal only with those people in the "unable to make the trip" category in a specific way. For example, in February 1989, changes were made to a route in the Little Bay area requiring customers from the Mirrabooka Crescent area to walk to either Little Bay or Bunnerong Roads for a bus service. An aged, disabled lady reported that because she was unable to walk long distances, she could not make her usual trips. On receiving this information the Schedules Development group approached the Taxi Subsidy Scheme representatives with an application on her behalf which ultimately proved successful.

In another example, the needs of a group of people from a sheltered workshop were able to be met in what proved to be an ingenious, if simple, method. In October, Route 461 was discontinued between Homebush Station, Wellbank Street and Concord Road, Concord. The survey from this area showed that a group of people working in a sheltered workshop in Pomeroy Street, North Strathfield, were subject to a major disadvantage without this service.

Because of the change they were required to walk to and from North Strathfield Station. Most were loathe to do this as some of them had been assaulted near this station. The Schedules Development section South and West, upon hearing of their dilemma, made a comprehensive study of the timetables and were able to provide a bus from Strathfield Station direct to and from the sheltered workshop using drivers that were "laying over" at the start and finish times of the workshop. Checks taken on this service show that 20 or more passengers are now using this service every week day to and from the workshop.

Further Work

Since the initial studies were done, there has been a comprehensive review of the bus

Ampt, Kennedy

routes in one area of the South-West Division of the STA, and a new initiative in the form of a Busplan has been developed. This has taken the form of a pamphlet which details the plans for updating the routes/services in the area. It has been delivered to most homes in the region. This has had the dual objectives of:

- o informing users and non-users (prospective users) of the services which are available and which may change, and
- o asking for comments on the system from the general public.

While it is not possible at this stage to measure the impact of the first objective, the response from both users and non-users in terms of comments has been significant. About 1,000 responses have been received at the present time.

Following on from this, a further study is planned, the objectives of which are:

- 1) to record/analyse the characteristics of trips currently being made on the system in the Busplan area,
- 2) to determine the current level of satisfaction with the existing level of service,
- 3) to record/analyse the characteristics of trips being made after the introduction of the Busplan changes,
- 4) to determine the level of satisfaction at that time.

The proposed methodology for examining these issues is set out in the next section.

Scope of the Survey

Since the aim of the project is to report actual travel and satisfaction with the system, it is only necessary to include actual users of the buses. In the context of this study, there will be three categories of users:

- 1) those people using the system **before and after** the changes -- these people can compare and evaluate the changes as they perceive them.
- 2) those people using the system **before, but not after** the changes -- these are people for whom the changes may have caused them to change their mode of travel, or not to make the trips.
- 3) those people **not** using the system **before** the changes, **but who travel by bus after** their implementation.

A normal type of longitudinal "before-after" survey in which the sampling frame consists of users who are contacted before the changes, and again afterwards, will cover people in groups 1 and 2. People in group 3, however, would need to be selected from users *after* the changes.

Sampling Frame and Sample Selection

The STA has two target groups from which the sample is to be selected for this study.

- o The first consists of those people who have responded to the Busplan proposal in the form of sending in comments either on the form provided or on extra sheets of paper. It should be noted that these people include those with positive comments only, those with negative comments only, and those with some positive and some negative comments. They also consist of both users and non-users, although it is understood that the non-users are composed almost entirely of people with negative comments ("we don't want the bus coming down our street")
- o The second consists of a representative sample of bus users. These would be selected at random from the population of users. Most of them would not have responded with comments to the Busplan.

Selection of the **first sample** is fairly straightforward. It is proposed by the STA that all those persons who provided addresses (about 500) be contacted in a before-after study.

This means that the data collected in this way will represent all those people who responded to the Busplan proposals (either positively or negatively) and who gave addresses. This is an important gauge of these people's behaviour and satisfaction levels and certainly can be used to provide the basis for making them feel part of the STA's decision-making process, but a further sample would be needed to ensure adequate representation of the public.

The selection of the **second sample** should ideally be done from the population of all bus users in the area. Fortunately, the timing of a comprehensive set of on-board surveys could allow the use of these records from which to choose a sample of users. Given that the on-board surveys consist of either a random selection of bus passengers, or at least a known proportion of travellers (in terms of number of trips per route, time of day, day of week, etc.), it would be possible to select a sample from these respondents.

A stratified sample would be selected, to ensure an adequate representation of users at all times of day as well as of rare-users.

Ampt, Kennedy

Survey Method

The survey method could involve either a self-administered questionnaire mailed to respondents or a personal interview. Each have advantages and disadvantages:

Personal interview

This method has the advantage that it achieves response rates of between 80% and 90% -- a very straightforward method of ensuring high data accuracy. It has a slight problem in this case, that it may well appear to respondents that they are being followed incessantly (firstly on-board the bus, or by responding to the Busplan, and then being "chased" by an interviewer).

Self-administered method

This has the advantage that it may not appear as intrusive as the personal interview, but the disadvantage of relatively lower response rates (60-65%) even after a comprehensive series of follow-up reminders. This can, however, be counteracted by a) controlling for sampling errors, and b) carrying out some modest form of non-response follow-up. The latter could be done in the form of personally visiting a small sample of non-responding persons/households to check the characteristics of non-respondents (both socio-demographically, and from a bus travel perspective). If they do not differ significantly from respondents, it can be concluded that the non-response error is not significant. If, however, there is a difference, some steps may be able to be taken in the weighting procedure to adjust for these differences.

Considering all factors, the self-administered approach (with multiple follow-ups) will be adopted.

Questionnaire Design

In order to achieve the objectives of the survey, the questionnaire will contain the following data items:

- o details on a recent trip (for the sample of on-board users, it may be possible to customise the questionnaire to relate to the trip on which they were surveyed.)
[*origin, destination, trip purpose, time of day travelled, frequency, route*]
- o level of satisfaction with several characteristics of the trip, e.g. reliability (at both ends, cleanliness, seat availability)
- o some information on whether the Busplan was received/read/appreciated.

Rationalisation of Bus Services

The answers relating to level of satisfaction need to be recorded in a rigorously quantitative manner, so that appropriate comparisons can be made after the implementation of the changes.

Conclusions

Any attempts to alter bus services which impact on existing travel patterns meet with resistance from those who perceive themselves to be disadvantaged by the changes.

The use of before and after surveys which identify the extent of transport disadvantage resulting from service alterations has provided State Transit with a basis upon which to fine-tune the alterations. In addition, the surveys had a number of secondary benefits, including an enhanced State Transit image in the community.

The experience of the initial surveys, combined with a strong commitment to community consultation by State Transit has led to the development of a new survey methodology.

The study described above expands the objectives of the before and after survey. Instead of focusing on areas of possible transport disadvantage, it aims to develop a measure of customer perceptions towards service reviews.

The results of this study will give an overall measure of the impact of service alterations on State Transit.

References

- Appleby, L (1985) *Differences in the Level of Bus Service Provision, Report submitted to the Human and Social Factors Division, Transport and Road Research Laboratory, Crowthorne.*
- Hopkin, J M, Jones, P M and Stokes, G (1988) *Bus Service Levels in Urban Areas: Effects on Bus Use and Travel Behaviour, Transport and Road Research Laboratory, Research Report 151.*

Acknowledgements

The authors would like to acknowledge the initiative of Roger Wilson, without whose perseverance, the approach described here would never have got off the ground. And Trevor Knight made sure that it all happened!