Quality of Service in Special Service Paratransit: The Users' Perspective

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The purpose of this paper is to develop measures of quality of service in special service paratransit and to gauge the importance of various service attributes to users of these services. A set of service attributes was compiled, and the attributes were categorized into eight aspects of service quality. These eight aspects are reliability and on-time performance, comfort, convenience of making reservations, extent of service, vehicle access, safety, driver characteristics, and responsiveness to the individual. Questionnaires were mailed to elderly and handicapped users of these services; the respondents were asked to rank each aspect and its corresponding attributes as to importance in achieving service quality. The questionnaire results were analyzed by using psychometric scaling techniques. The results of the analysis indicate that not all types of users place the same importance on different characteristics of these services. Users younger than 65 years old place considerable emphasis on service reliability and extent of service. Wheelchair users believe that satisfactory vehicle access is extremely important. Users older than 65 years old believe that safety is of paramount importance. The most important attributes of service quality from the standpoint of all users are then developed.

During the past several years research in special service paratransit has grown substantially. This research has included in-depth analyses of coordination of services (1,2), studies of service innovations and the use of taxicabs for the transportation of the elderly and the handicapped (3,4), the costs of providing services under different organizational arrangements, and economies of scale in providing services (5,6).

Quality of service, however, is one aspect of research of special service paratransit that has not received equal and thorough attention in the literature. The studies of special services that have dealt with quality of service have done so only indirectly. Most researchers, providers, and policymakers rely on surrogate measures of quality, such as average trip distance, square miles of area served, and equipment available for wheelchair users. But these measures may not completely reflect the many ways in which service quality can vary. Except for a study by Falcocchio (7), no study has dealt with quality of service directly.

Detailed measures of quality of service are needed to answer a number of questions concerning special services. A complete evaluation of attempts to coordinate services requires ascertaining whether quality of service has changed and in what manner. Quality of service should be analyzed to gauge the effectiveness of the many federal, state, and local government programs that deal with special services. A measure of service quality could provide useful information to providers who are interested in improving quality in the most cost-efficient manner possible.

Efficient provision of special service transportation requires knowledge of the productivity of the various inputs used to provide these services. Productivity is most commonly measured as a ratio of output produced to inputs used. In paratransit services, output includes both quality and quantity dimensions. In order to adequately measure productivity, quality of service must be considered along with measures of the amount of service produced.

Questions such as these require a detailed understanding of the dimensions of quality of service in paratransit. The measures that have been used in previous studies are probably not adequate to gauge the full impact of service quality. Special service paratransit differs from conventional fixed-route transit in a variety of ways, including the nature and purposes of the services, the types of users, and trip purposes served. Thus quality-of-service measures developed for fixed-route service may not adequately capture all the dimensions of service quality inherent in the provision of special services.

The purpose of this paper is to develop measures of quality of service in special service paratransit. The various aspects that comprise service quality are examined. The importance of these various dimensions of quality of service is then presented based on the results of a questionnaire sent to users of these services.

QUALITY-OF-SERVICE MEASURES IN SPECIAL SERVICES

The development of quality-of-service measures for special service transportation requires the specification of the service attributes that comprise service quality and the weighting of these attributes by their importance. Measures of quality of service in fixed-route transit served as the starting point in the development of a quality-of-service index (8-12). The paratransit literature was also examined, and a list of service dimensions either implied or specifically used in research and demonstration studies was then compiled. Additional attributes based on the observations of the researchers were added to this list. The service attributes from the various sources were then categorized into eight service aspects, each representing a basic overall dimension of service quality:

1. Reliability and on-time performance--waiting time, delays, and variations from scheduled times;
2. Comfort--characteristics of the ride as well as comfort in waiting for the vehicle;
3. Convenience of making reservations--time needed to make reservations and accommodation to changes in reservations;
4. Extent of service--hours in which service is available and restrictions on locations served;
5. Vehicle access--ease of getting on and off the vehicle, assistance provided, and distance from the house or destination to the vehicle;
6. Safety--probability of having an accident while getting into or out of the vehicle, as well as traffic accidents;
7. Driver characteristics--courtesy, friendliness, neatness, and professionalism of the drivers; and
8. Responsiveness to the individual--relationship between the user and the provider's office.

A tentative list of service attributes included under each of the eight aspects of service quality was sent to a select panel of 22 experts drawn from academia, government, and providers. Each of the experts was chosen to serve on the panel based on his or her experience and expertise in transportation for the elderly and the handicapped. The experts were asked to rate each of the tentative set of attributes as to its importance in determining

the various aspects of service quality. They were also asked to add any additional attributes that they believed were important determinants of quality of service. The results of the questionnaire were then used to develop a final set of attributes under each of the eight service aspects. Attributes receiving a low rating by experts were not included in the final list. The refined set of aspects and attributes is shown in Figure 1.

USER EVALUATION OF QUALITY OF SERVICE

The list of attributes and aspects shown in Figure 1 does not indicate the relative importance of each characteristic in explaining service quality in transportation for the elderly and the handicapped. To ascertain the importance of each aspect and its corresponding attributes, a questionnaire was developed and mailed to users or potential users of these services. The respondents were asked to rank each aspect and its attributes as to importance in achieving service quality. A ranking rather than a rating of attributes was used to reduce the complexity of the questionnaire. Certain demographic questions were also included in the questionnaire.

Questionnaires were mailed to 659 people drawn from lists provided by five different organizations that deal with the elderly and the handicapped. Names were obtained mostly from providers of special services, but some names also came from lists of individuals attending a series of workshops on transportation for the elderly and the handicapped. Thus the sample was designed to be heavily oriented toward individuals who actually use these services. The sample of handicapped users does not include the most severely handicapped, who find it extremely difficult to use any form of transportation. In addition, excluded from the sample were the blind, deaf, and mentally retarded. Thus the sample was restricted to semiambulatory and wheelchair users younger than 65 years old and individuals 65 years old and older.

A total of 228 people returned the questionnaires. Of these, 155 questionnaires were usable. The questionnaires were classified into four categories: semiambulatory persons younger than 65, wheelchair users younger than 65, nonhandicapped persons older than 65, and handicapped persons older than 65 (6 percent of this last category were in wheelchairs). The breakdowns and descriptive statistics are given in Table 1. Twelve of the 155 respondents are not included in any of the categories either because the information needed to categorize them was missing or because they did not belong in any of the four categories. Thus the analysis was conducted based on the responses from 143 questionnaires.

Because the respondents were asked to rank attributes and aspects, the analysis of the results through traditional nonparametric statistical methods could yield information only on the order of importance of the dimensions of service quality. The degree of importance cannot be obtained by using these methods. To establish a degree of importance, the rankings were transformed to interval scales by using the psychometric methods set forth by Guilford (13).

Guilford's method is based on Thurstone's law of comparative judgment (case V), which assumes that the variances of the responses to different attributes are equal. The method converts an ordinal scale to an interval scale by assuming that each

Figure 1. Aspects and attributes of quality of service.

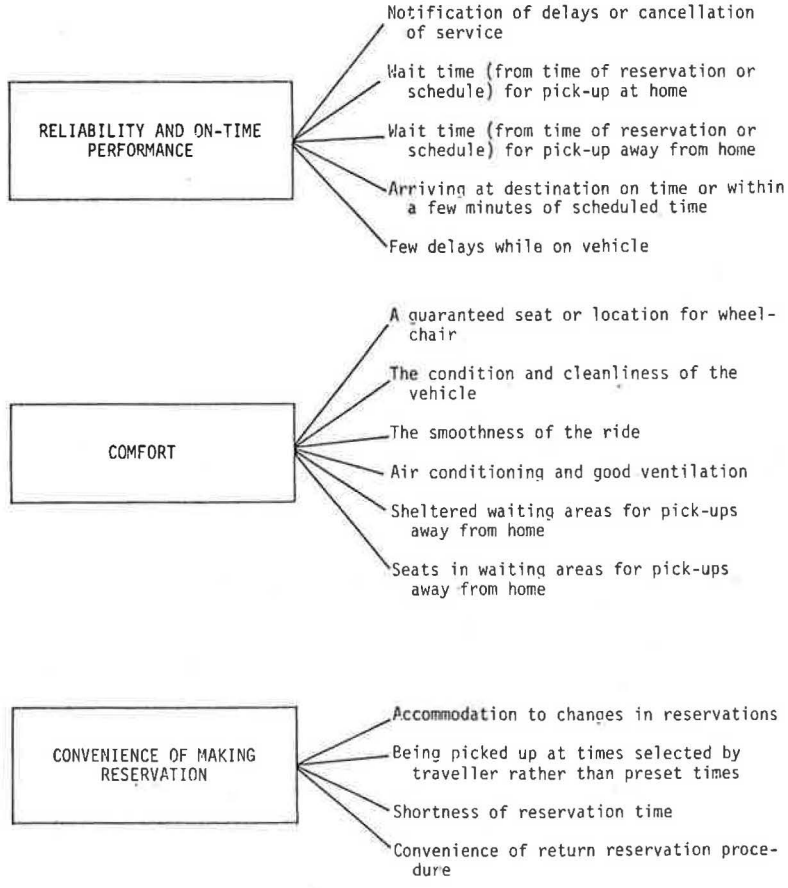
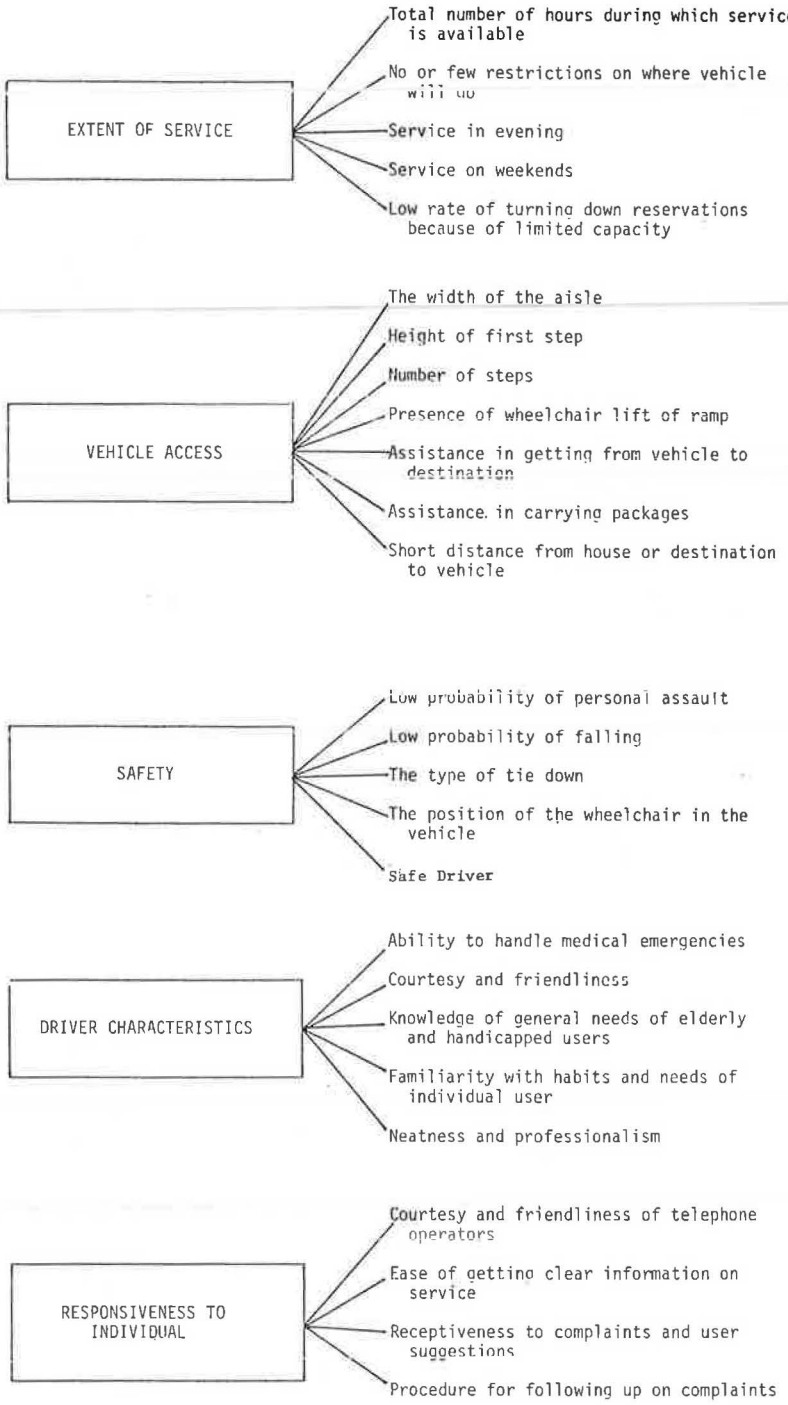


Figure 1. Continued.



respondent perceives the scaling of attributes that define a system, object, or situation differently. It can be shown that, for large samples, such differences can be represented by a normal distribution. This method assumes that there is a true scale relationship between the attributes (or aspects) that have been ranked, and that differences in rankings are caused by this normal dispersion characteristic of large populations.

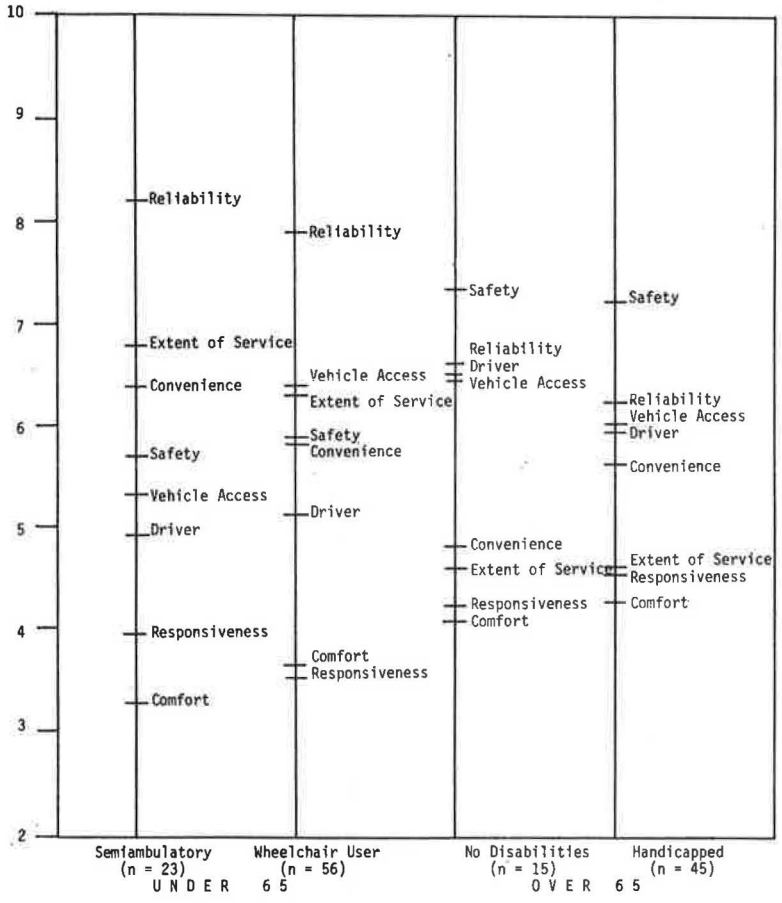
By applying this method to the survey sample, the aspects and attributes were placed on a dimensionless scale that indicates the degree of relative importance of each to service quality.

The scale values derived for the eight aspects for each of the four categories of respondents are shown in Figure 2. (The more important the aspect, the closer it is to the top of the figure.) For the younger-than-65 handicapped group, reliability is by the far the most important aspect. This may be partly because this group is much more likely to be employed. They also rank extent of service significantly higher than do the elderly. Wheelchair users ranked vehicle access as the second most important aspect, which probably reflects the greater frequency with which they encounter inaccessible transportation. The elderly rank safety as the most

Table 1. Characteristics of sample of elderly and handicapped respondents.

Item	All	Younger-than-65 Group		65 Yr and Older Group	
		Semiambulatory	Wheelchair User	No Disabilities	Handicapped
No.	155	23	57	17	46
Percentage of respondents who are					
Female	74	64	67	88	93
Employed full-time	25	26	45	0	2
Employed part-time	19	26	25	18	9
Not employed	56	48	30	82	89
Percentage of respondents whose income is					
<$7,000	39	39	21	50	67
$7,000-$10,000	16	13	10	36	18
$10,000-$15,000	15	9	21	14	10
>$15,000	30	39	47	0	5
Percentage of respondents who usually or often use special service transportation	42	30	40	53	59
Percentage of respondents who have never used special service transportation	88	74	91	94	91

Figure 2. Scale values of eight aspects.



important aspect, followed by reliability. The characteristics of the driver (including training and courtesy) are much more important to the elderly than to younger persons. Ease of dealing with the provider's office and comfort are both ranked low in comparison with other aspects by all categories of users.

An analysis of the attributes under each aspect also reveals similarities and differences among the categories of users. All four user groups ranked the attributes under the aspects of reliability and on-time performance in approximately the same order (Figure 3). Reaching the destination on time is most important, with notification of delays or cancellation second, and the other three attributes fall considerably lower. Nevertheless, those in the younger-than-65 groups ranked on-time performance significantly higher than did the elderly. The importance of on-time performance relative to waiting (either at home or away from home) appears to indicate that use of a window instead of exact pick-up times improves quality of service if the ability of the vehicles to keep to their schedule is increased.

All categories of users agree that the two most important attributes under extent of service (Figure 4) are the total hours during which the service operates and the lack of restrictions on trip desti-

Figure 3. Scale values of attributes of reliability and on-time performance.

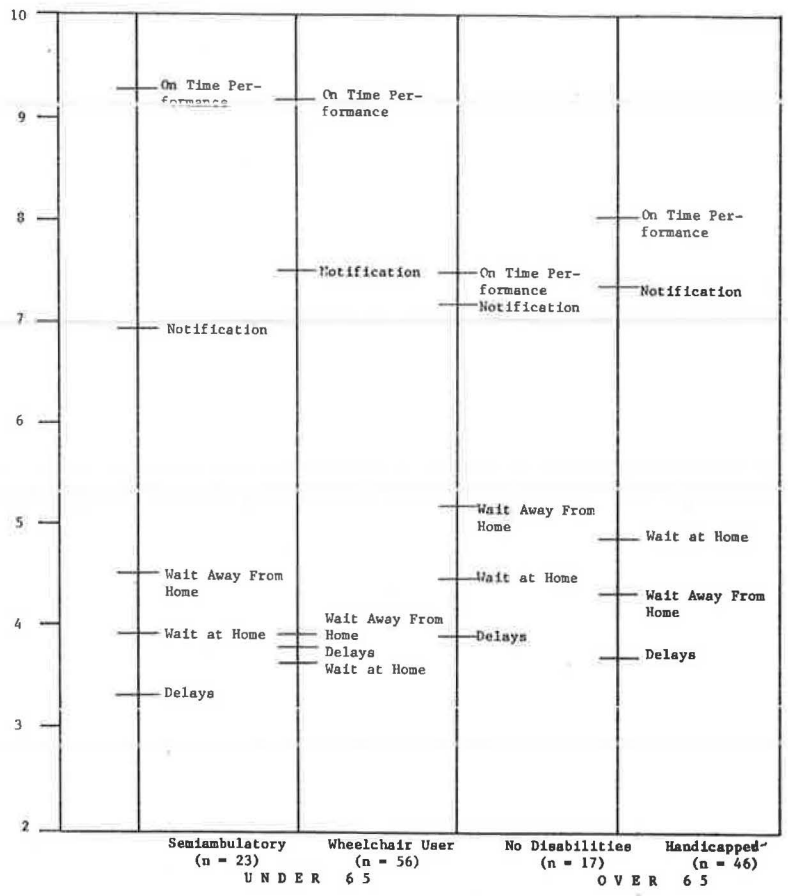
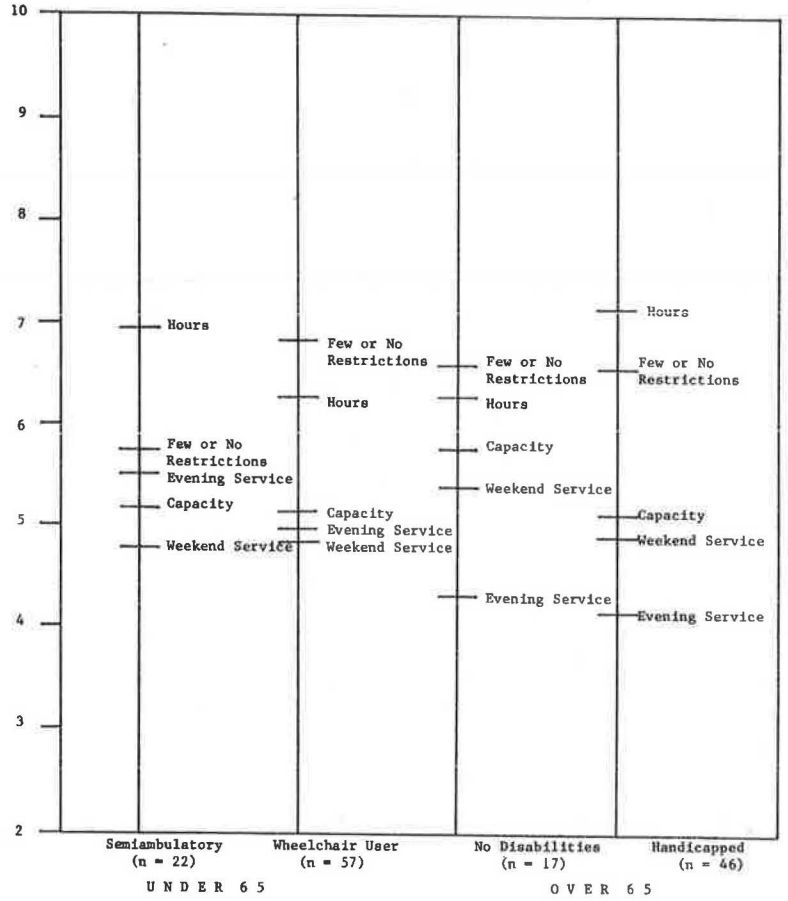


Figure 4. Scale values of attributes of extent of service.



nations. Because all users indicated that having few or no restrictions was more important than having enough capacity to prevent being turned down for service requests, this would indicate that restricting trip destinations or purposes to solve capacity problems will decrease quality of service significantly. The two age groups differ in that those in the younger-than-65 groups prefer evening to weekend service, whereas the elderly prefer weekend to evening service.

Three of the four user categories agree that a safe driver is the most important attribute of safety (Figure 5). Wheelchair users rate it a close second to the type of wheelchair tiedown. A small probability of falling is rated relatively higher by the two semiambulatory groups than by the other two, as might be expected. Low probability of assault while waiting for the vehicle is relatively more important to the elderly than to the younger groups.

Under the aspect of vehicle access (Figure 6), the most noticeable feature is that the importance of having a lift or ramp overwhelms all other attributes for wheelchair users. For all other groups, the height of the first step is most important. The distance between the vehicle and the house or destination is the second or close third most important attribute for all groups, and the number of steps is important to all ambulatory groups. Assistance from the drive is ranked below vehicle design access features; thus a higher quality of service is achieved by having an easily accessible vehicle than by providing assistance. All groups apparently prefer independence over assistance.

Under the aspect of convenience (Figure 7), the attributes are grouped relatively close together, which indicates that there are no strong preferences for one attribute over another. A short reservation time and being able to choose the pickup time tended to receive a higher rating. This indicates that demand-responsive service with a short reservation time is superior to fixed-route service. Accommodation to changes is ranked low, but if the reservation time is short, there is less need to make changes.

For the aspect of driver characteristics (Figure 8), all groups rank knowledge of the general needs of the elderly and the handicapped and courtesy and friendliness the most important attributes. The younger-than-65 groups rate knowledge of general needs the most important by a significant margin. The elderly groups put greater emphasis on courtesy and friendliness. The nonhandicapped elderly place the least importance on ability to handle medical emergencies. Familiarity with personal needs and habits is ranked lowest by all the groups.

The aspect of responsiveness to the individual (Figure 9) was partly meant to measure the degree to which passengers believe that the provider cares about their needs. The elderly indicated that the courtesy and friendliness of the telephone operators was the most important attribute, which is the strongest indication that the providers' responsiveness was important. The younger handicapped groups valued clear information more highly. Ease of making a complaint was rated higher than having a follow-up procedure by all four groups; there may be a feeling that if the agency is receptive to a complaint they will respond with or without a formal procedure.

Finally, under the aspect of comfort (Figure 10), a guaranteed seat or wheelchair position is the most important attribute by a significant margin. Wheelchair users put the greatest emphasis on a guaranteed position probably because a position is necessary in order for them to ride at all. A sheltered waiting area is ranked second highest by all groups, except the nonhandicapped elderly, who rank seats at the waiting area second. The younger handicapped groups ranked the condition and cleanliness of the vehicle lowest, and the elderly groups ranked air conditioning and good ventilation lowest.

CONCLUSIONS

The analysis indicates the relative importance of the different aspects and corresponding attributes of service quality from the perspective of the users of special services. It indicates that not all types of users place the same importance on different characteristics of these services. Thus high-quality services oriented toward one group of users may not be perceived as the highest quality by other groups of users. Unless economies of scale are an overriding consideration, this analysis suggests that, where resources are scarce, higher-quality service may be best obtained by having several providers, each oriented toward a specific user group.

The analysis indicates that users younger than 65 place a great deal of emphasis on service reliability and extent of service. Wheelchair users attach a great deal of importance to satisfactory vehicle access. Thus providers specializing in transportation for these groups should emphasize these aspects in order to produce high-quality service.

Users older than 65 believe that safety is of paramount importance. Reliability, driver characteristics, and vehicle access are also aspects that these users believe are important. Because these users are mostly retired, they can more easily schedule activities around the hours of service provided. Thus extent of service is not as important to these users it is to the younger groups.

The most important attributes of service quality from the standpoint of all types of users can also be obtained from this analysis. These attributes are as follows:

1. Arriving at destinations on time or within a few minutes of scheduled times;
2. Notification of delays or cancellation of service;
3. Many hours during which service is available;
4. Few or no restrictions on where the vehicle will go;
5. Safe drivers;
6. Safe tiedowns for wheelchairs;
7. Short step height;
8. Short distance from house or destination to vehicle;
9. Short reservation time;
10. Being picked up at times selected by the traveler rather than at preset times;
11. Courteous, friendly drivers;
12. Drivers who have knowledge of the general needs of elderly and handicapped users;
13. Easily obtainable and clear information on how to use the service;
14. Courteous and friendly telephone operators; and
15. A guaranteed seat or location for a wheelchair.

High-quality services from this perspective would be those that arrive on time, notify users of delays, are available many hours during the week, and have few restrictions on destinations. Providers of high-quality services should hire or train drivers who are safe, courteous, friendly, and who have knowledge of the general needs of the users. The vehicles should be easily accessible because users prefer independence over assistance.

High-quality special services should have short

Figure 5. Scale values of attributes of safety.

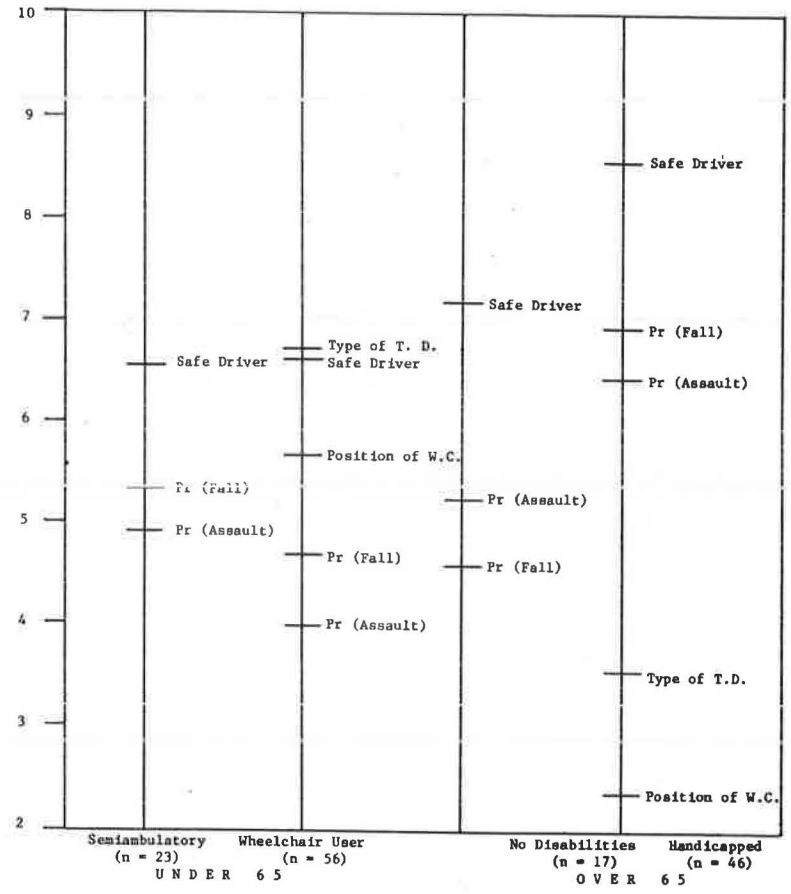
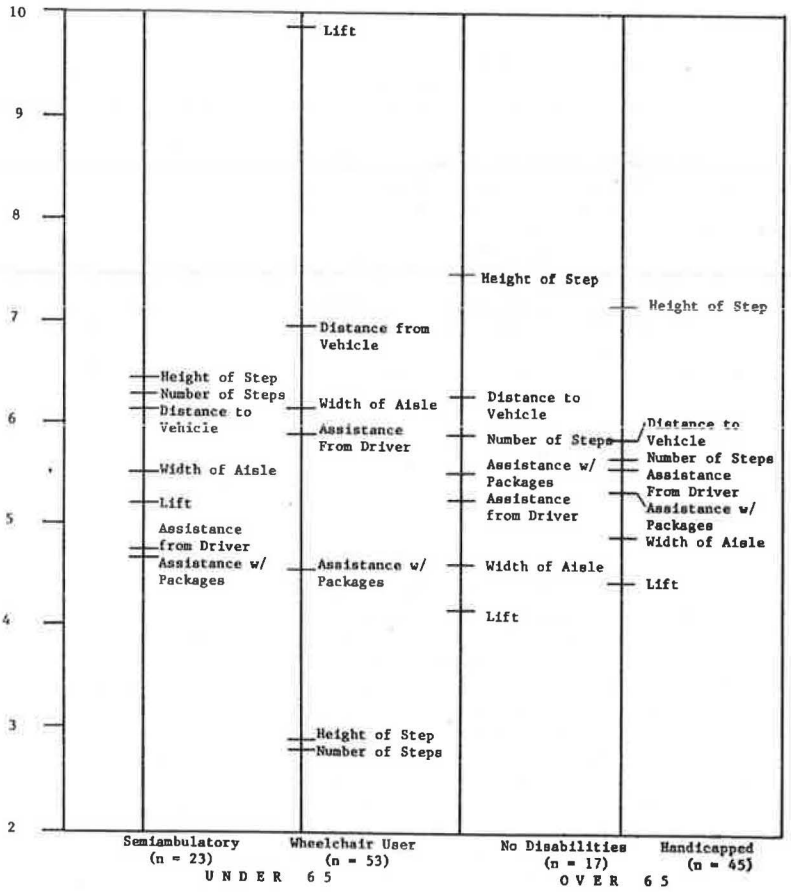


Figure 6. Scale values of attributes of vehicle access.



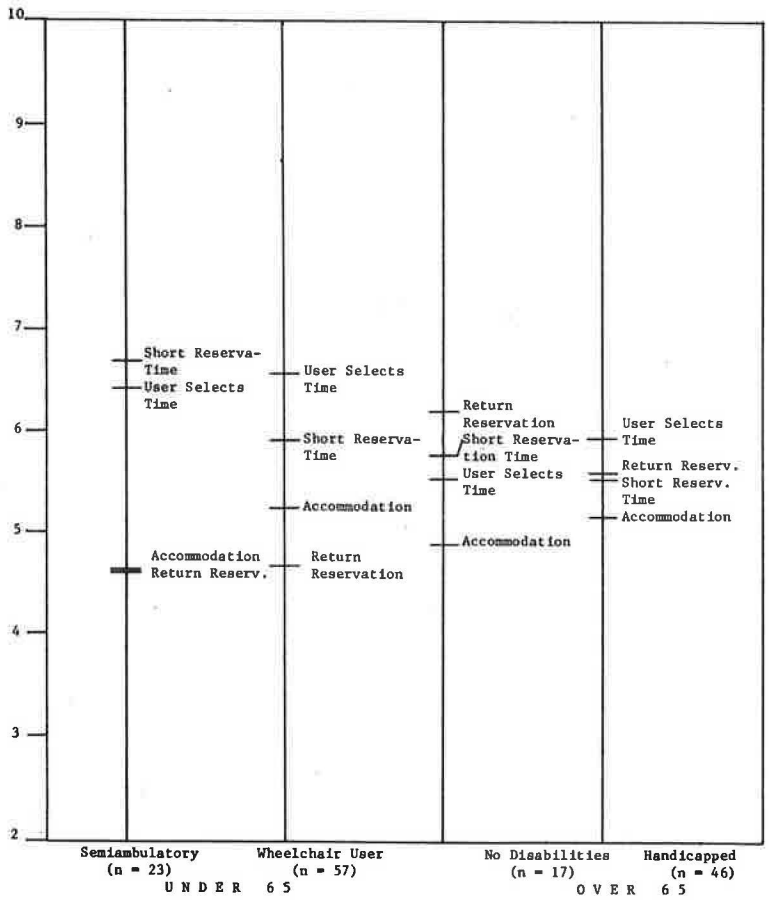


Figure 7. Scale values of attributes of convenience of making reservations.

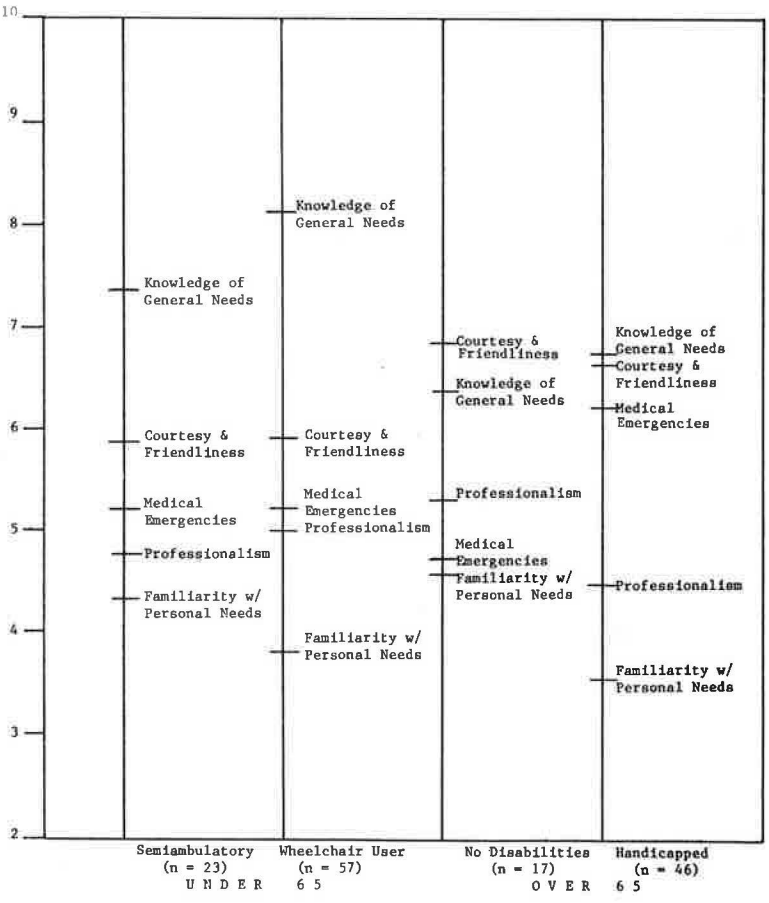


Figure 8. Scale values of attributes of driver characteristics.

Figure 9. Scale values of attributes of responsiveness to individual.

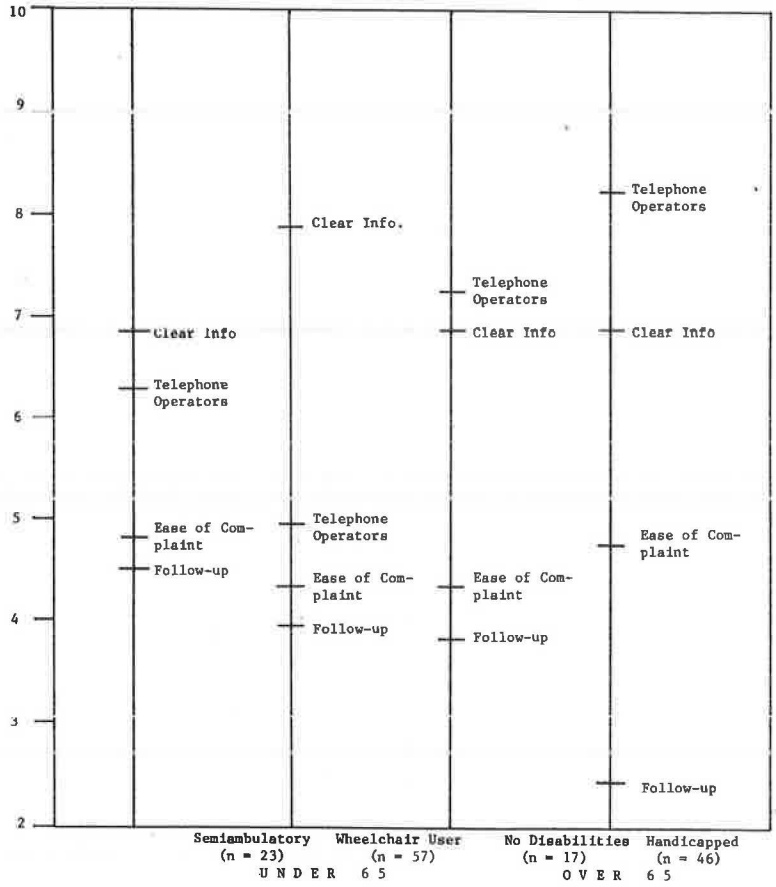
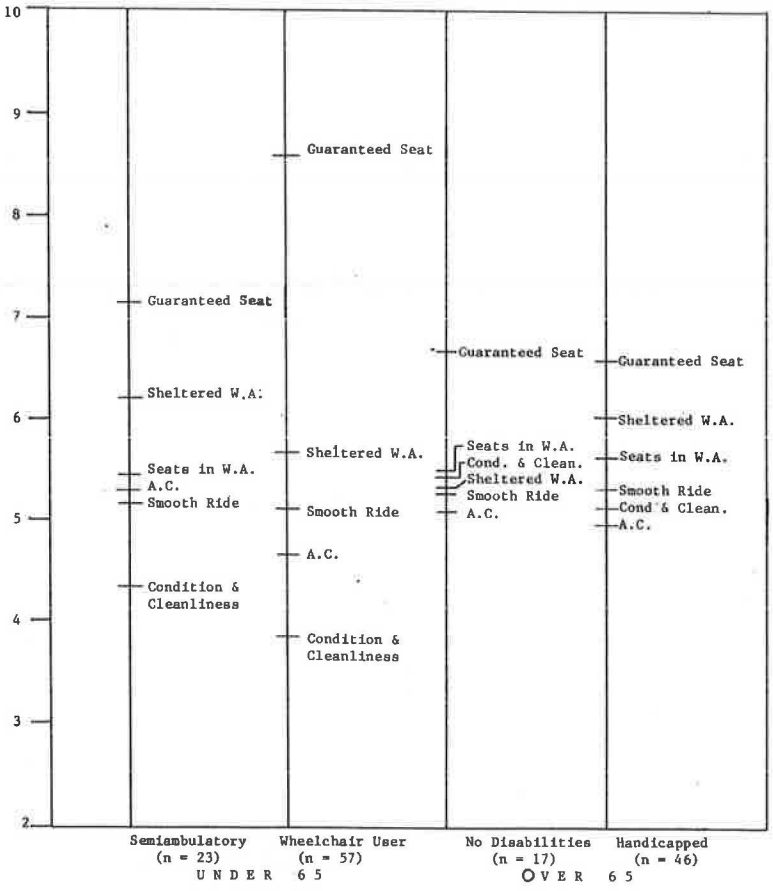


Figure 10. Scale values of attributes of comfort.



reservation times, require users to negotitate short distances from the house or destination to the vehicle, and have pickup times selected by the user rather than at preset times. These attributes describe demand-responsive service and imply that, from the users' perspective, such service is of superior quality to fixed-route service. Route-deviation service would also rank higher than fixed-route service by the sample of users.

The analysis of attributes also indicates that high-quality services ensure that users can obtain clear information on how to use the service, that the telephone operators are courteous and friendly, and that all users have a guaranteed seat or location for a wheelchair.

This analysis implies that the provision of high-quality transportation services for the elderly and the handicapped is complex and involves careful management of a variety of service attributes. Much planning, organization, and control are needed to ensure that high-quality services result.

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Inquiry of the Canadian Transport Commission into Intercity Bus Travel for Disabled Persons in Newfoundland

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The objective of the paper is to (a) demonstrate how the Canadian government, acting through a regulatory body [the Canadian Transport Commission (CTC)], approached one particular issue under federal jurisdiction concerning transportation of the handicapped, and (b) present the results of its action. The issue discussed is the intercity bus service for disabled persons on the Island of Newfoundland, which is located off the eastern coast of the Canadian mainland. The Island has a population of approximately 536,000 and is the most densely populated part of the province. The intercity service currently is provided by CN Roadcruiser, a crown agency. The inquiry (the approach chosen to investigate the issue) is described, and the findings, along with the subsequent action taken by the CTC, are given. Terms of reference of the inquiry included consideration of the most efficient service for able-bodied and disabled persons alike. The primary finding was that the use of lift-equipped buses in the regular Roadcruiser service was not the appropriate course of action. Recommendations made in the report of the inquiry were adopted by the Motor Vehicle Transport Committee. In the Committee's decision, Roadcruiser was ordered to take specific courses of action that would lead to improvements for disabled travelers on the existing service, and it was recommended that the federal government finance a 3-year experiment to develop a new transportation service that would be an integrated service, but focused on the transportation requirements of disabled persons.

The accessibility of intercity bus service for disabled travelers appears to be an issue of higher profile in Canada than in the United States. The interest in Canada may be attributed, at least in part, to the interaction of two mutually exclusive events that have taken place or are taking place in the field of transportation in Canada.

The first event is the increasing reliance on bus service as a substitute for passenger train service for relatively short-distance intercity travel. In the province of Newfoundland, bus service replaced passenger train service in 1968.

The second event is an increasing effort on the part of the rail mode to accommodate nonambulatory persons and to encourage them to travel independently without an attendant. This effort commenced in earnest after a decision in March 1980 by the Railway Transport Committee (RTC), a modal committee of the Canadian Transport Commission (CTC). The