Measuring the Effectiveness of Personalized Ridesharing Assistance

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Cumbersome data-collection techniques hinder evaluations of many ridesharing programs. Fundamental performance measures have eluded researchers, who often depend on infrequent surveys of ridesharing program participants for their data. The Share-A-Ride program in Silver Spring, Maryland, however, has developed a reliable evaluation process that does not depend on special surveys. Share-A-Ride uses an ongoing data-collection effort based on follow-up telephone calls to program participants. The resulting information helps make the program responsive to its clients and serves as a basis for detailed evaluation. Share-A-Ride has raised pool formation rates beyond those typically produced by traditional ridesharing programs. Approximately 54 percent of Share-A-Ride's participants who were active at the 2-year mark of program operations had formed new ridesharing arrangements. Attrition claimed a significant number of participants, which emphasizes the importance of rematching participants and maintaining data base integrity. The average participant received three follow-up calls from Share-A-Ride staff. More than half of the new ridesharers did not start pooling until after their first follow-up call. Nearly three-quarters of the participants who were sent matches for pooling ultimately contacted others on their lists. The evaluation also measured staffing requirements for implementing the personalized approach. The Share-A-Ride experience shows that labor can be reduced after the initial 2 years of program operations. Although the labor-intensiveness of personalized ridesharing assistance makes it somewhat more expensive than traditional approaches, the resulting benefits are significant.

Hundreds of ridesharing programs exist around the country, yet little is known about how well they place people into carpools, vanpools, or public transit. Even less is known about which assistance techniques are most effective. The main problem is that cumbersome and expensive data-collection techniques hinder evaluations of ridesharing programs. Most evaluations rely on infrequent surveys. Consequently, the typical evaluation provides only a snapshot of a highly dynamic situation. To make matters worse, if the survey is of the mail-back variety, it is likely to be biased.

Previous research underscores the problem. Wagner's review of major U.S. ridesharing programs in 1978 conveyed the frustration of trying to collect enough data to report on even the most fundamental performance measures (1). Glazer and Webb have recommended reporting standards for ridesharing programs, but their suggested improvements in evaluation procedures have been slow in reaching the local level. [Note: J. Glazer and P. Webb's work, Evaluation Kit No. 1: Procedures for Carpool Program Evaluation, was prepared as a supplement to NCHRP Report 241, Guidelines for Using Vanpools and Carpools as a TSM Technique, in November 1981.] At the time of this writing, FHWA has work under way to develop standards for ridesharing program evaluations. All of the latest evaluation guidelines, however, are limited by their reliance on survey data.

The unfortunate result of the evaluation dilemma is that ridesharing agencies have little feedback on how responsive they are to their clients and how they can improve their programs. Wagner estimated that, on average, 16 percent of the people who applied to the ridesharing programs in his sample entered new pools or expanded existing pools (1). However, recent evidence suggests that much higher success rates are achievable, particularly for employer-based programs. Shearin's research in 1981 (2) indicates that personalized assistance is having a profound effect in increasing success rates in several programs around the country. An important side benefit of personalization is the ongoing collection of data, which serves as a continual source of feedback and a basis for evaluation.

The evaluation of Share-A-Ride, a personalized ridesharing program in Silver Spring, Maryland (3), is described in this paper in order to show in detail how effective a personalized rideshare assistance program has been after 2 years of operation. Also, an unconventional but easy and thorough way to perform an evaluation, based almost entirely on data collected as a normal part of implementing the personalized approach, is described.

BACKGROUND ON SHARE-A-RIDE

The Maryland-National Capital Park and Planning Commission created the Share-A-Ride program to test the potential of personalizing the marketing, matching, and follow-up processes. Share-A-Ride's personalized approach involves direct marketing with the largest employers in the market area. The program staff make ongoing, personal contacts with employer coordinators who help promote the program to their employees. Meanwhile, people who work for small employers receive information on the program by way of brochures, posters, and leaflets in building lobbies, banks, parking garages, and other public areas.

The staff process program applicants (called participants in this paper) through a hybrid manual and computer technique that produces high-quality matches. The matching process relies on staff judgments that are based on information in the program's data base and on a large map of the region. Share-A-Ride participants receive match information not only when they first enter the program, but each time their names appear in match lists of later participants.

Soon after sending the initial match information, the staff make follow-up calls to record what actions the new participants have taken and to offer advice if necessary. As needed, the staff continue to make periodic calls to update the status of participants and urge them to form new ridesharing arrangements.

Since 1979, Share-A-Ride has applied the personalized approach in the Silver Spring business district, a suburban employment center just north of Washington, D.C. The program supplements a region-wide computerized ridesharing service for the rest of the Washington area operated by the Metropolitan Washington Council of Governments.

The Silver Spring business district has a work force of nearly 18,000 people. Approximately 58 percent of the employees work for small businesses that have fewer than 100 employees. Moreover, approximately 70 percent of the employees are in office-related land uses, the remainder being primarily in retail-oriented uses. In recent years, the average modal shares of Silver Spring employees have been 70 percent automobile drivers, 12 percent automobile passengers, 12 percent transit passengers, and 6 percent walk and other (4). People commute to work in Silver Spring from all parts of the Washington-Baltimore region. The peak overall demand for long-term spaces at public parking facilities in Silver Spring is 83 percent of existing ca-

pacity. Several lots and garages regularly operate at 100 percent of capacity (5).

Two previous papers have reported various aspects of the Share-A-Ride program. In the first paper (6), the philosophy of the personalized approach and its practical applications were discussed. In the second paper (7), the hybrid manual and computer system used to process applicants was described.

The focus in this paper is primarily on the level of effort and measures of performance associated with Share-A-Ride's personalized approach. It offers a basis of comparison for other ridesharing professionals who wish to evaluate their own programs. It also points the way toward improved data-collection methods for ridesharing programs.

RESEARCH METHODS

This research used two sources of data: logs of staff activities and the program's data base. The logs of staff activities provided information on the level of effort required for Share-A-Ride's personalized assistance. During a 1-year period, the staff recorded on one log the time spent on matching, follow-up calls, marketing, and other activities. Another, more detailed log--kept over a 4-week period--showed the amount of time required to complete each personalized match list, rematch list, and follow-up call.

Share-A-Ride's data base provided information on the program's participants. The data base contains all of the information from the original application forms as well as transactions on matches, rematches, and follow-up calls for all participants. Because Share-A-Ride's data base management system permits easy retrieval of a variety of performance measures, special surveys of participants were practically unnecessary. The follow-up calls that are so essential to the personalized approach serve double-duty as a continual telephone survey of Share-A-Ride's participants. Unlike conventional rideshare program surveys, the follow-up calls are not restricted to one sampling point. And, unlike mail-back surveys, the follow-up calls do not bias the data toward those who would choose to respond.

Each record in the Share-A-Ride data base contains more than 600 characters of information in 126 fields. Comments recorded during each follow-up call are placed in additional records that are linked to the participant's main record from a separate part of the data base. Fifteen sets of fields are available to store the identities and dates of matches. Nine sets of fields store a history of follow-up status codes and dates for up to nine follow-up calls. In addition, five sets of fields contain the history of pools formed. Other fields contain information about the type of assistance requested, date of the application, previous mode, assistance provided, and standard information such as name, address, telephone numbers, map grid locations, and work hours.

The Share-A-Ride computer programs allow staff to store the data and generate a variety of reports as a part of day-to-day operations. The programs consist of two sets of routines, each with a different purpose. Both, however, depend on a data base management package supplied by the computer manufacturer. The first set of routines is a collection of custom-written programs that generate match letters and other special reports and make the necessary changes to the data base. The second set is a flexible user-oriented information retrieval package that allows the Share-A-Ride staff extract information from the data base. The retrieval routines were used to conduct this evaluation.

For evaluation purposes, the data base is not only an efficient and flexible source of information, but it is reliable as well. A key advantage of the Share-A-Ride data base is that it does not rely on infrequent surveys and the memories of participants for the dates on which they applied to the program, received their first match lists, received each set of rematches, and formed their pools. With this and other information now available in the Share-A-Ride data base, questions can be asked about ridesharing that have not been asked previously.

SHARE-A-RIDE'S PERFORMANCE

Initial Assistance

When Share-A-Ride participants first apply to the program, they indicate preferences for various combinations of carpool, vanpool, and transit assistance. The staff then responds accordingly to provide either matches for pools or transit route and schedule information. Figure 1 groups the types of requests for assistance and Share-A-Ride's responsiveness to these requests. The grouping of categories of assistance makes it easier to visualize how well the program has met the needs of its participants. The staff were able to fill requests completely 78 percent of the time. For 13 percent of the participants, the program partly filled their requests by providing either match or transit information when the person requested both. The program could not provide assistance for only 8 percent of the participants.

The mailing of no-help letters does not typically terminate contact with those participants who are difficult to serve. The record of follow-up calls to these people indicates significant efforts to help them until they ultimately receive useful information or drop out of the program.

Many ridesharing agencies have focused on shortening the time between the receipt of an application and the mailing of a match list to the participant. To measure the possible effects of response time, the difference in days between the application date (when the application was received) and the letter date (when the match list was mailed) was calculated for each participant. Share-A-Ride's median response time was 7 days. The distribution of response times was analyzed for people who ultimately started pooling with someone on their match lists versus the distribution for people who did not pool. No significant difference between the two distributions was found, which indicates that response time does not appear to be an important determinant of propensity to pool. The impact of instant matching (while the applicant is still on the telephone) was not tested but is a worthy issue for future research.

Attrition

Based on the record of follow-up calls, 58 percent of Share-A-Ride participants remained active after 2 years of program operations. The high attrition rate illustrates the importance of keeping the data base current. Of the people who dropped out, 66 percent moved and 34 percent lost interest.

Figure 2 shows the cumulative application and attrition rates over the program's first 2 years. Figure 3 shows similar curves for the participants who ultimately entered new ridesharing arrangements. The attrition rate of ridesharers is much less than for participants as a whole. Approximately 82 percent of this group of participants were still in the program at the 2-year mark. The vast majority of the attrition among these people was due to moves rather than loss of interest.

Figure 1. Initial assistance to participants.

ASSISTANCE REQUESTED					ASSISTANCE PROVIDED			
	Car Pool	Van Pool	C&V Pools	Total	Matches	Transit Info	Both	No Help
Matches	452	40	480	972	**877**			95
Transit Info				100		**93**		7
Both	164	22	426	612	**181**	**45**	**346**	40
	616	62	906	1,684	1,053	138	346	142

226   1316

All Requests	Partially Filled	Filled Requests	Did Not Fill
100%	13%	78%	8%

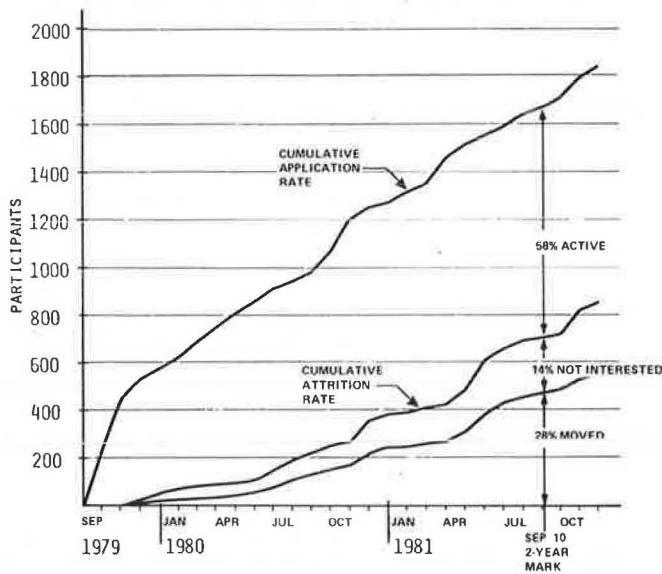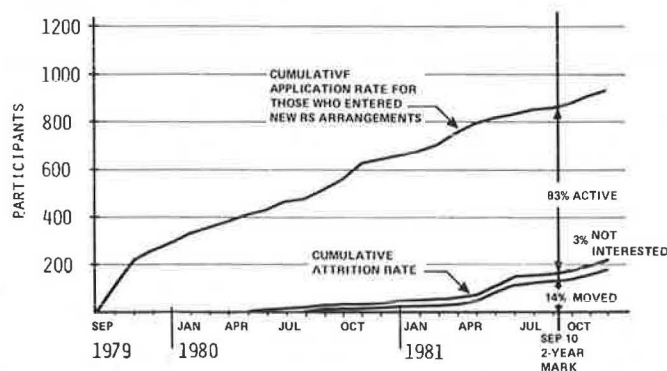**Figure 2. Applications and attrition for all Share-A-Ride participants.**

Figure 3. Applications and attrition for Share-A-Ride participants who entered at least one new ridesharing arrangement.

Active Participants

At any given time, the difference between the cumulative application and attrition curves is the number of active participants who have entered new ridesharing arrangements, who are still interested in being matched, or who are receiving further service from the Share-A-Ride program. Figure 4 shows

Figure 4. Active Share-A-Ride participants.
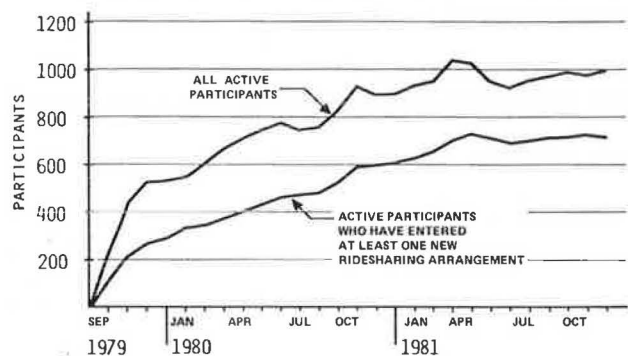
total active participants on the top curve and those who have entered new ridesharing arrangements on the lower curve. Because the attrition rate for ridesharers is so much lower than for participants as a whole, at a given time ridesharers and former ridesharers make up most of the active participants. For example, by December 1, 1981, 73 percent of the active participants had entered new ridesharing arrangements since joining the program. Because some of these people subsequently dropped out of pools or transit and were looking for new arrangements, a net total of 54 percent of all active participants were still ridesharing at that time.

Mode Switching

Table 1 shows the effectiveness of Share-A-Ride in getting participants to switch modes of transportation. The first two columns of the table represent all Share-A-Ride participants and those active as of November 1981 subdivided by their previous commuting modes. Note that 304 participants were in pools before joining the program. It can be assumed that most of these people joined Share-A-Ride to expand their existing pools.

The third column in Table 1 shows that a total of 529 of the active participants (54 percent) entered new ridesharing arrangements after joining the program and were still ridesharing. Another 183 people--not shown in the table--entered new ridesharing arrangements, later dropped out, but were still interested in receiving more assistance. The right portion of the table splits the ridesharers into carpoolers, vanpoolers, and transit users and further subdivides the carpoolers into categories that reveal some effects of the matching process. Counting only the participants who were pooling with

Table 1. Mode switching by participants.

Mode	Previous Mode		Total Current Ridesharers as of November 1981	Current Mode				
	Total Participants	Active Partici- pants as of November 1981		Carpoolers			Vanpoolers	Transit Riders
				With Partici- pants Only	With Nonpar- ticipants Only	With Both		
Drive alone	1,050	598	325	81	114	65	15	50
Pool	304	226	134	29	33	53	13	6
Transit	288	129	60	19	21	17	3	
Other	42	22	10	2	3	3	1	1
Total	1,684	975	529	131	171	138	32	57

Note: There is a total of 440 carpoolers.

Figure 5. Distribution of participants according to employer size.
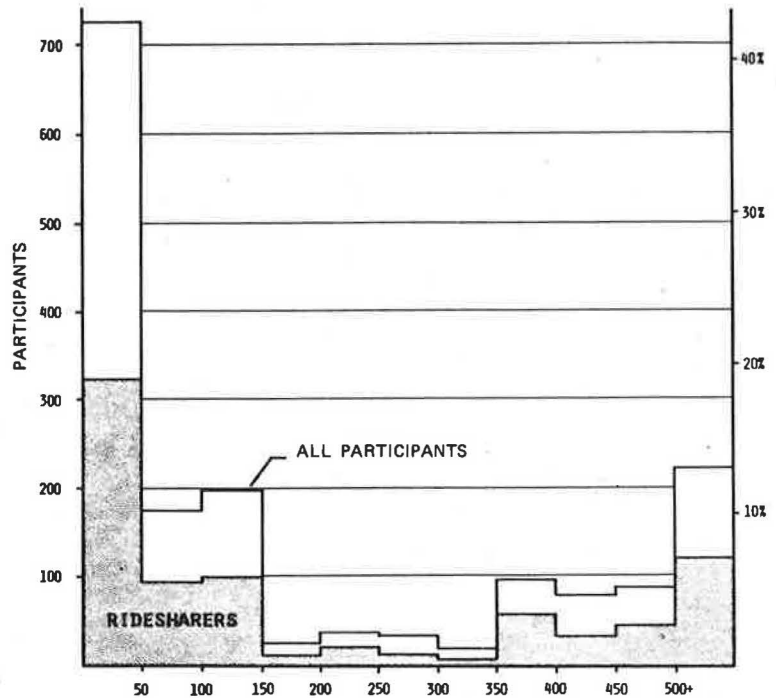
other Share-A-Ride participants or riding transit, up to 37 percent of the active participants could be claimed to be in new ridesharing arrangements as a direct result of the match lists of transit informa- tion provided by Share-A-Ride. Another 17 percent of the active participants were pooling solely with nonparticipants. Although the program played no direct role in inducing this last group to pool, the program's marketing efforts may have had some in- direct influences.

Pool Composition and Size

Figure 5 illustrates the predominance of partici- pants from small employers in Share-A-Ride's market area, which implies the necessity of matching people between different employers. Such matches have ap- parently been successful. Among Share-A-Ride pools, 78 percent have participants from more than one em- ployer, whereas the other 22 percent comprise par- ticipants from the same employer.

Because the Share-A-Ride data base keeps a record of the sizes of pools, the number of nonparticipants who were indirectly affected by the program through their association with Share-A-Ride participants can be calculated. The 472 active poolers are in 291 different pools comprising 910 total members. The

average pool size, therefore, is 3.1, and the number of nonparticipants indirectly affected is 438. Fig- ure 6 shows the distribution of the 472 poolers ac- cording to pool size.

New Pools for Dropouts

The data on Share-A-Ride pools indicate the impor- tance of rematching people as they drop out of pools. The table below gives the distribution of a total of 838 participants according to the number of ridesharing arrangements they have had:

No. of Ridesharing Arrangements	No. of Participants	Percent
1	719	86
2	95	11
3	20	2
4	4	1

Approximately 14 percent of the new ridesharers have been in more than one ridesharing arrangement over the initial 2-year period.

Findings from Follow-Up Calls

The follow-up status codes in each participant's data record help the staff serve Share-A-Ride participants by keeping track of who needs what kind of help. The data base also provides a historical record of the service provided to each participant and the action taken. This information has been extremely valuable in evaluating the Share-A-Ride program.

Figure 7 shows the current status at the end of November 1981 for all Share-A-Ride participants who had applied to the program by September 10, 1981. The bars in Figure 7 show the numbers of participants who were in ridesharing arrangements as of late November 1981. The bars indicate separate counts for carpoolers, vanpoolers, and transit riders, as well as the degree of staff involvement before the pools were created or expanded. Participants who started ridesharing before the first follow-up call are shown separately from the ones who started after the first follow-up call and from the ones who started after receiving matches.
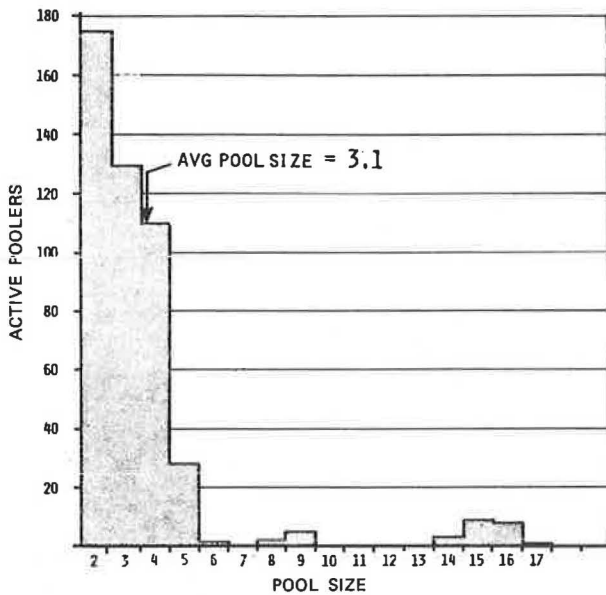
Figure 8 shows the status of participants who were not ridesharing in late November 1981. The

bulk of people in this group dropped out of the program because of moves or loss of interest.

Based on information obtained in the early phase of the program, 72 percent of participants who were sent matches for pooling contacted others on their lists. If this percentage is applied to all participants over the 2-year period, the total number of people who contacted others on their match lists is approximately 1,110. By combining this estimate with the record of actions of participants as determined from follow-up calls, we can derive a picture of the participants who were motivated enough to contact others about ridesharing. Table 2 classifies the 1,110 participants who are estimated to have contacted others according to ridesharers and nonridesharers and three levels of action. The table suggests that 52 percent of the new ridesharers did not start pooling until after their first follow-up call from Share-A-Ride staff.

Figure 9 presents the distributions of ridesharers and all participants according to numbers of follow-up calls received from Share-A-Ride staff. As might be expected, the participants who entered new ridesharing arrangements received more follow-up calls than participants as a whole. Part of the reason is that ridesharers typically stay in the program longer than other participants. Over the initial 2 years of the program, ridesharers received an average of 4.2 calls each, whereas participants as a whole received an average of 3.1 calls each.

SHARE-A-RIDE'S LEVEL OF EFFORT

During the initial years of the program, Share-A-Ride has operated with a full-time staff of two field representatives and a secretary. The field representatives have been responsible for matching, follow-ups, marketing, and some administrative duties; the secretary has been responsible for entering and maintaining the information in Share-A-Ride's data base and performing support functions.

Based on the experience in Silver Spring, a good estimate can be made concerning the size of the market area and volume of applications that the personalized approach can reasonably handle. Interacting with the data base and producing letters, postcards, and other computer-generated documents have been easy and quick and therefore are not the limiting factors in implementing the personalized approach. The time devoted by the field representatives to the matching follow-up and marketing functions, however, is the key consideration.

According to the logs kept by Share-A-Ride's field representatives, it takes an average of 18 min
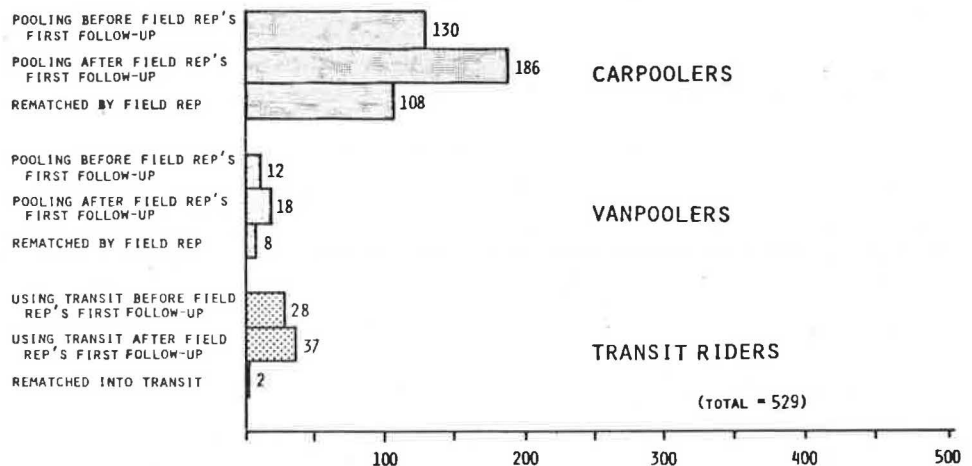
Figure 6. Distribution of active poolers according to pool size.

AVG POOL SIZE = 3.1

Figure 7. Latest status of active ridesharers.

POOLING BEFORE FIELD REP'S FIRST FOLLOW-UP	130
POOLING AFTER FIELD REP'S FIRST FOLLOW-UP	186 CARPOOLERS
REMATCHED BY FIELD REP	108
POOLING BEFORE FIELD REP'S FIRST FOLLOW-UP	12
POOLING AFTER FIELD REP'S FIRST FOLLOW-UP	18 VANPOOLERS
REMATCHED BY FIELD REP	8
USING TRANSIT BEFORE FIELD REP'S FIRST FOLLOW-UP	28
USING TRANSIT AFTER FIELD REP'S FIRST FOLLOW-UP	37 TRANSIT RIDERS
REMATCHED INTO TRANSIT	2

(TOTAL = 529)

Figure 8. Latest status of active and inactive nonridesharers.

NEEDS REMATCH OR OTHER HELP ▦ 193
MATCH AT A LATER DATE ▦ 51

CONTACTING OTHERS ▦ 21
CONTACTS MADE; NO POOL ▦ 14
NO CONTACTS YET ▦ 27

MOVED ▦ 468
NOT INTERESTED ▦ 241

APPLICANT WANTED INFO ONLY ▦ 37

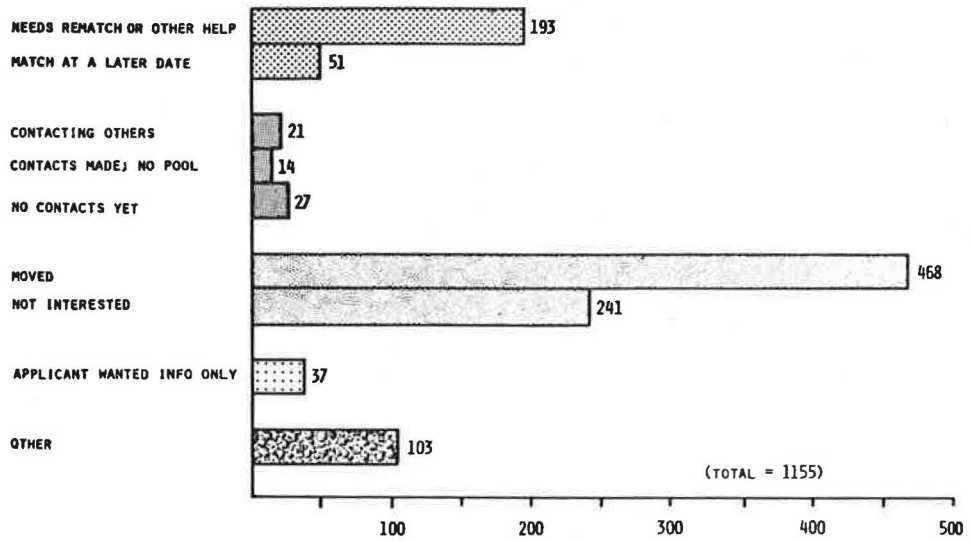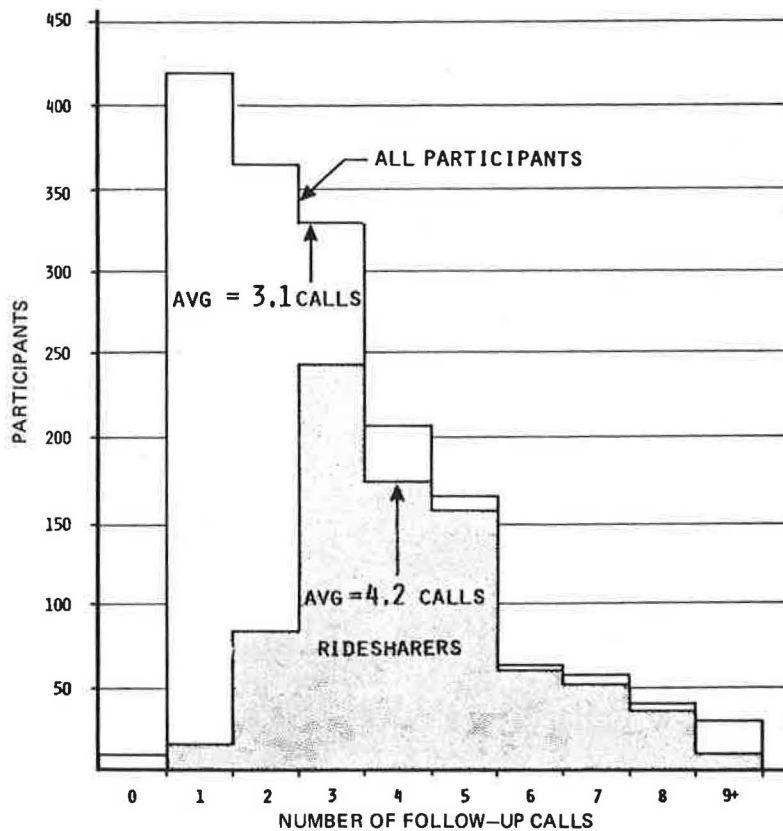OTHER ▦ 103

(TOTAL = 1155)

100   200   300   400   500

Table 2. Actions taken by all participants who contacted others.

Action	Entered New Ridesharing Arrangement During 2-Year Period	Did Not Start Ridesharing During 2-Year Period	Total
Contacted others and started ridesharing before follow-up calls	403		403
Contacted others but did not start ridesharing before follow-up calls	168	177	345
Did not contact others before follow-up calls	267	95	362
Total	838	272	1,110

Figure 9. Distribution of participants according to number of follow-up calls received from Share-A-Ride.

ALL PARTICIPANTS

AVG = 3.1 CALLS

AVG = 4.2 CALLS

RIDESHARERS

PARTICIPANTS

0   1   2   3   4   5   6   7   8   9+
NUMBER OF FOLLOW-UP CALLS

to process the initial match list for each participant. This time includes use of the hybrid manual and computer matching techniques and preparing the mail-out to the participant. It takes approximately 6 min to rematch a participant--less time than the initial match--because the field representative knows the participant's specific needs as conveyed in follow-up calls. The field representatives send out, on average, two rematch lists for every three initial match lists. The follow-up calls take an average of 9 min each, which includes the time required for repeated attempts to reach an individual.

Although personalized matching, rematching, and follow-up require some time, marketing and administrative duties take up most of the field representative's average day. Approximately 82 percent of the field representative's time was spent on marketing and administrative tasks, whereas only 8 percent was spent on matching and rematching and 10 percent on follow-ups. By the end of the second year of operation, each field representative was responsible, on average, for marketing a work force of 9,000 employees and processing 500 active participants on an ongoing basis.

The initial years at Share-A-Ride required considerable marketing to make a strong impact in the market area. The staff also devoted a significant amount of time assisting in the evolution of the program's new techniques. Now that the program is well established, less time is needed for marketing and administrative duties; it is now at the point where one less field representative is needed for continuing the program in the existing market area. Moreover, the logs show that a single field representative could handle even more than the 18,000 employees in Silver Spring. A major reason is that employer coordinators and volunteers are taking on a larger share of the promotional activities.

Extrapolating from the Share-A-Ride experience, a similar suburban business district that has a work force of approximately 25,000 could expect to generate a daily volume of 4 to 5 initial matches, 2 to 3 rematches, and 12 to 16 follow-up calls. That work load would require a single field representative to spend approximately 25 percent of the time on matching and rematching, 30 percent on follow-ups, and the remaining 45 percent on marketing and administrative duties. A secretary would also be necessary to provide support services. Another field representative and possibly another secretary would be needed to serve each additional increment of 25,000 employees.

Not surprisingly, it does cost a ridesharing program more to implement the labor-intensive personalized approach rather than the traditional automated approach. Based on the experience at Share-A-Ride, the cost of personalizing a program could range between $100 to $150/person placed in a new ridesharing arrangement. Mature programs and those with a significant proportion of large employers can expect to be at the low end of this range or perhaps even below it.

The extra cost of personalizing the assistance process is reasonable when compared with the costs

Figure 10. Performance measures for Share-A-Ride.
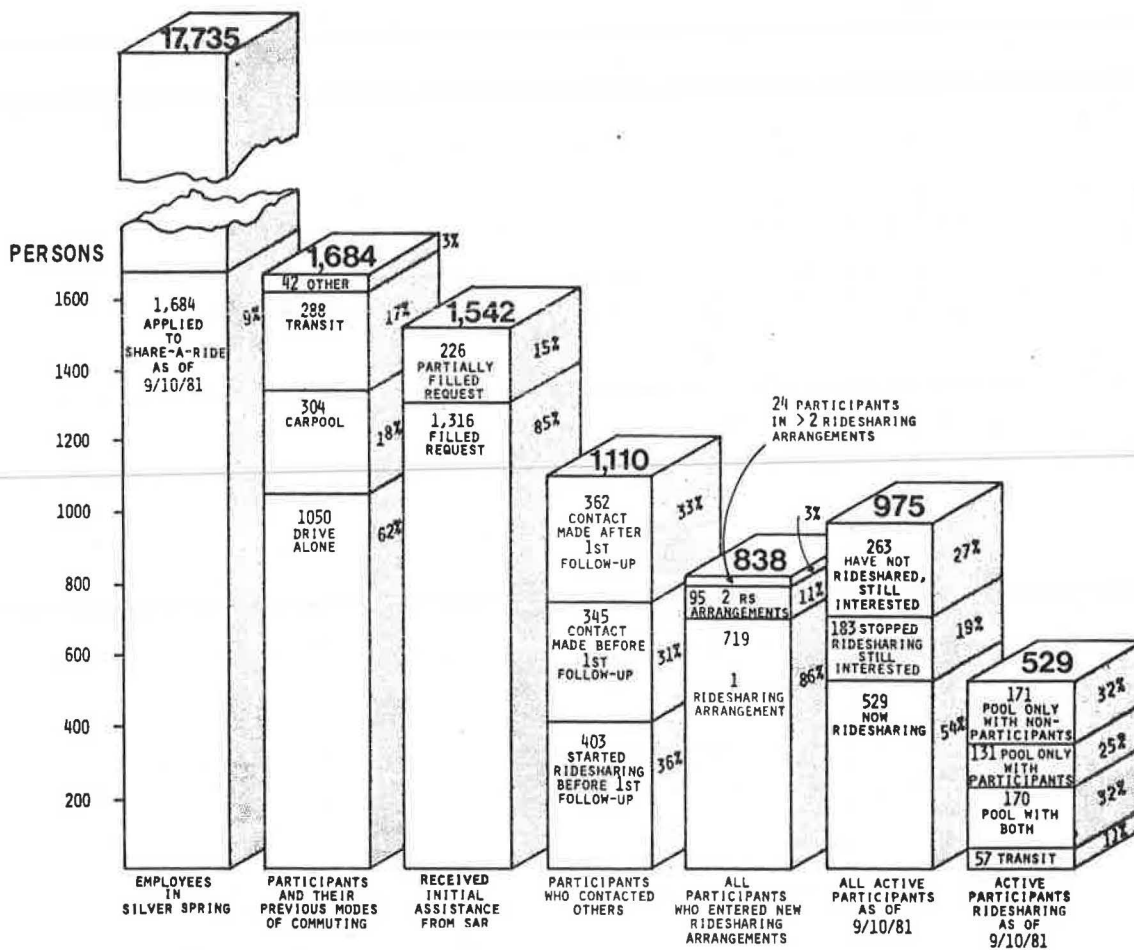
of the alternatives. Constructing a public parking space, for instance, is many times more expensive than helping a person carpool under the personalized approach. Extending transit service into low-density areas is also much more costly.

SUMMARY AND CONCLUSIONS

A summary of Share-A-Ride's major performance measures is shown in bar chart form in Figure 10. The detail provided here and in the supporting discussion has been extremely useful to project management in fine-tuning Share-A-Ride's operations.

Although it is not yet possible to determine quantitative cause-and-effect relations for the individual factors that affect Share-A-Ride's effectiveness, the evaluation reveals several features of the personalized approach that have produced high success rates:

1. Sending rematch information automatically to the people who appear in each new match list,
2. Making follow-up calls to urge people to take action on their ridesharing arrangements and assist people who need help,
3. Rematching participants who drop out of pools or want to change their ridesharing arrangements, and
4. Keeping the data base up-to-date via follow-up calls so that information is reliable and usable.

Although follow-up calls are extremely important in achieving high pool formation rates, they should be preceded by high-quality matches. Furthermore, the person who makes the follow-up calls should have knowledge of the rationale behind the specific matches that were sent to participants.

A regular program of follow-up calls, which is supported by a data base as comprehensive as Share-A-Ride's, can also provide significant benefits in the management of a ridesharing program. Such an approach integrates evaluation into the daily operations of a ridesharing agency. The results, moreover, are more reliable than those for occasional telephone or mail-back surveys, which are expensive and cumbersome ways to measure performance. Ridesharing programs need continuous monitoring of performance through a personalized data base to provide quick, accurate feedback.

The evaluation of Share-A-Ride shows that ridesharing professionals can produce results, by way of pools formed, for far more people than they typically help today. Low pool formation rates need not be the norm. Perpetuation of low success rates can only hurt a ridesharing agency's credibility by generating negative word-of-mouth against the agency as well as ridesharing in general.

Ridesharing agencies, through their marketing, raise people's expectations. By personalizing their programs and incorporating ongoing evaluation efforts, they can better meet the expectations of the people who come to them for assistance. Personalized programs do cost more than traditional approaches, but the absolute public benefits from the additional ridesharing still far outweigh the costs.

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