# CHARACTERISTICS OF AUTOMATIC TELLER MACHINE USERS BY MULTIVARIATE ANALYSIS

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## Abstract

This study attempts to pursue an adequate analytical determination of target market automatic teller machine user characteristics which can be used as strategic input to the marketing planning process. To this end, the Wright State University consumer panel was utilized to probe in detail both frequency and type of ATM use and specific user profiles using both Multiple Discriminate Analyses and Automatic Interaction Deduction. Further analysis was then used to develop user/non-user profiles and respondent discrimination in regard to preferences for potential ATM locations.

## Research Based Perspective

ATMs[1] have been at the forefront of technological change in the financial industry for almost a decade.[2] To date, however, very few definitive and truly representative surveys have been made of user/non-user characteristics and consumption preferences. This study, then, attempts to pursue an adequate analytical determination of target market ATM user characteristics which can be used as strategic input to the marketing planning process.

Dayton, Ohio, with its diverse socio-economic population base, has long been considered an excellent test market that is generally representative of at least mid-American reaction to and acceptance of new products, ideas and concepts. This is no less true when it comes to financial products as the markets total mixture of banks, savings and loan organizations, credit unions and other financial institutions is a worthy cross-section of most of the top 100 SMSA's nation-wide. Couple this with an aggressive posturing toward ATMs[3] and heavy installation and promotional bolstering and you have a situation fraught with potential for the attitudinal examination of both the use and acceptance of automatic teller machines.

Adding to this positive evaluative atmosphere is the presence of Wright State University (a burgeoning institution of some 15,000 students), the Institute for Community and Organizational Development of which contains a Center for Consumer Studies which, in turn, harbors a 1,000 member Consumer Panel which is stratified to closely represent the composite population of the region. As such, it is a valid measure of consumer opinion in an area which itself is a portrayal of average citizen response. In the fall of 1980, therefore, a proportional sample of one-half of this panel was interrogated via a direct mail questionnaire in order to probe in some detail the following key areas:

- Actual ATM use
- Specific institutional ATM use
- Frequency of ATM use
- Type of ATM use
- Best/least liked use factors
- Specific reasons for non-use

and--

- Preference for certain types of proposed ATM locations.

Totally, some 343 valid responses were received and initially analyzed using the SPSS program and subsequently the SAS and OSIRIS packages. Subsequent data manipulation concentrated on the classification of users vs. non-users by the application of Multiple Discriminant Analysis (MDA)[4] and Automatic Interaction (AID)[5] which are complementary in their basic interaction. The following analysis is useful, then, in that it graphically profiles users vs. non-users, clearly defines reasons for non-use and delineates among a series of potential general locations for future ATM installation. Aside from the obvious importance of determining key ATM user profiles, the data should be extremely useful in evaluating future ATM site locations. Thus positioned, it is a unique aggregation of data that is heavily laden with strategic management potential.

Obviously, the total study generated copious quantities of useful data, but decidedly too much to be completely incorporated here. The intent of this discussion, then, will be to concentrate on two specific question areas; namely, they are (1) user/non-user profiles and (2) discrimination among individual respondents in regard to their preference for potential ATMs locations.

## ATM User Profile

Overall, some 28.6% of all respondents had used an ATMs. Considering that these machines were first introduced into the Dayton market some five years ago, the user rate is quite good.[6] Interestingly enough, the rate of use of specific financial institutions ATMs was relatively consistent within a range of 27.1% to 31.8% and showed only slight relevancy to total promotional funds expended. The rate and type of use is shown in Table 1.

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[1] ATM = Acronym used throughout this paper for Automatic Teller Machine.

[2] For the development of ATMs in the nation, look, for example, at Streeter, B. (1979), "Winning the West with a Shared ATM Network," ABA Banking Journal, September, pp. 86-93, and special report (1979), "Automated Tellers Make a Hit for County Seat Bank," May, ABA Banking Journal, pp. 49-50.

[3] At the time of the survey, September 1, 1980, banks, S&L's and Credit Unions were offering a total of 75 separate ATM locations to a market base of approximately 300,000 households.

[4] For further interpretation see Morrison, D. G. (1969), "On the Interpretation of Discriminant Analysis," JMR. Vol. VI, pp. 156-163.

[5] Green, P. E. (1978), Analyzing Multivariate Data. Dryden Press.

[6] Many studies have discussed the increased and future use of ATMs, O. S. Pugh and Ingram, F. J., (1978), "FFT and the Public," The Bankers Magazine V161N2, pp. 42-51, and Eisenbeis, R.A. and Wolkowitz, B. (1979), "Sharing and Access Issue," The Bankers Magazine V162N2.

TABLE 1

ATM USE

| RATE (PER MONTH) | % USING ATMs | TRANSACTION TYPE | % USING ATMs |
|---|---|---|---|
| 0-1 | 42.3 | Deposits | 47.9 |
| 2-5 | 39.1 | Withdrawals | 80.6 |
| 6-10 | 16.5 | Check balance | 14.3 |
| 11-15 | 2.1 | Pay bills | 20.4 |
| | | Transfer Funds | 15.3 |

It is apparent that the average user frequents an ATM five or less times per month for the primary purpose of either making a deposit or a withdrawal.

But what is the nature of the individual ATM user? An initial cursory examination would tend to profile the likely consumer as having the following characteristics:

(1) SEX - MALE
(2) AGE - 25-44 YEARS
(3) INCOME - $15,000 - $35,000
(4) EDUCATION - SOME COLLEGE
(5) EMPLOYMENT - FULL-TIME AS A MANAGER, SELF-EMPLOYED, SKILLED CRAFTSMAN OR TECHNICIAN
(6) MARITAL STATUS - MARRIED WITH 1 OR 2 CHILDREN
(7) RESIDENCE - HOMEOWNER OF A SINGLE FAMILY DWELLING IN THE $30,000 - $75,000 RANGE
(8) RACE - WHITE

Use Factors

This is not to say that other profiles do not have ATM potential,[7] but, rather, that initial data differentiation point one's target marketing efforts in this direction. Reasons for non-use (Table II) and the best/least liked user factors (Table III) are shown below.

TABLE II

REASON FOR NON-USE

| | % |
|---|---|
| (1) Never had the need | 53.0 |
| (2) My bank doesn't offer ATMs | 15.2 |
| (3) Don't trust machines | 8.9 |
| (4) Prefer personal contact | 7.4 |
| (5) Security concerns | 4.7 |
| (6) Never got around to acquiring a card | 2.7 |
| (7) Too easy to obtain money | 1.9 |
| (8) Don't need another card | 1.2 |
| (9) Misc. | 5.0 |

User Trait Discrimination

In an attempt to more precisely define user/non-user traits, the data was submitted to both Multiple Discriminant Analysis (MDA) and Automatic Interaction Deduction (AID). These dual techniques complement each other because MDA analyzes the data from the independent variables point of view while AID uses the dependent variables for grouping purposes. Another reason for combining the two techniques is that while MDA can provide some misleading results in regard to the presence of multicollinearity among variables, AID is somewhat less sensitive to this phenomenon.

Remembering that a large portion of the surveyed population (71.4%) has not used any ATMs, in order to identify the most discriminatory variables between the two groups (Users/Non-users), a discriminant analysis technique was performed. The analysis revealed one significant discriminatory function with an ability of 59% prediction. (Compare to Cpro = .19 and Cmax = .71). Table IV summarizes the results of the discriminant analysis.[8] From the results one can deduce that the following variables are the most discriminatory: employment status, sex, income, and education. From the size of the coefficients it is clear that only "education" has negative correlation and thus the higher the education the more likely the person will be to an ATM. The other variables with the positive signs will lead to the conclusions that those who are not employed full-time, female, or high-income are less likely ATM candidates.

TABLE III

BEST/LEAST LIKED FEATURES

| | Best Liked | % |
|---|---|---|
| (1) | Convenience<br>· No waiting in lines<br>· 24 hr. availability | 95.0 |
| (2) | Misc. | 5.0 |
| | **Least Liked** | |
| (1) | Break down too often | 27.0 |
| (2) | Security concerns | 10.0 |
| (3) | Machine card rejections | 8.0 |
| (4) | Forget PIN number | 7.0 |
| (5) | Too impersonal | 7.0 |
| (6) | Not enough locations | 6.0 |
| (7) | Misc. | 35.0 |

TABLE IV

USERS/NON-USERS ATTITUDES

| λ | Canonical Correlation | Level of Significance | % of Classification |
|---|---|---|---|
| .06 | .24 | .00 | 59 |

Discriminant Function $Y = .75H6 + .7H1 + .48Q4 - .4H4$[7]

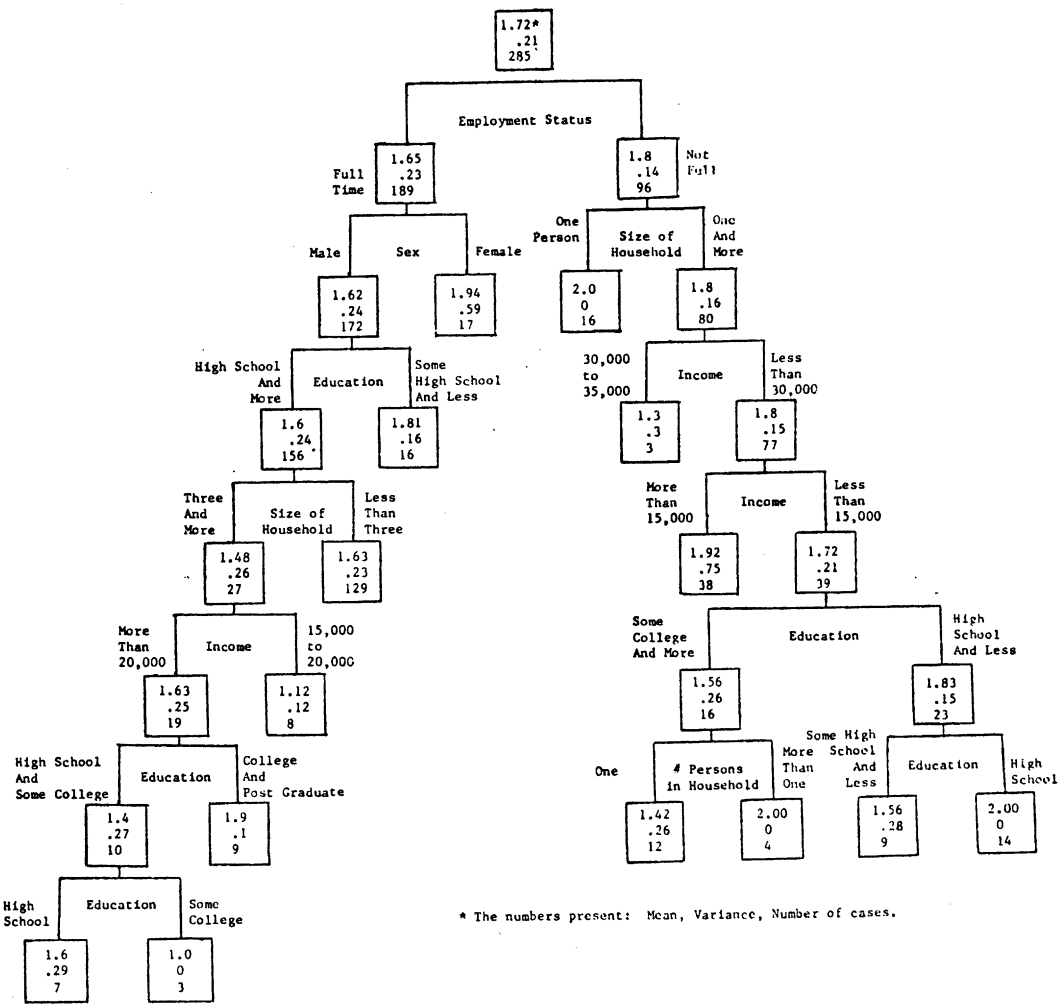
These conclusions are supported by the AID tree in Figure 1. Employment status, sex, income, and education separate among groups, but, in addition, the variable, "number of persons in a given household," has a major effect - especially in the group of not full-time employed. The more persons in a household, therefore, the more likely that household is to use an ATM. The income effect is not as clear, for among the full-time employees high income will lead to less likely ATM use, but among the not full-time employees, the higher the income the more likely the use will be.

[7] Demographics of ATMs on a more limited scale were also investigated by other researchers like: Hood, J. M., (1979), "Demographics of ATMs," The Bankers Magazine, V162N6, pp. 68-71.

[8] The variables' codes and explanations are in the Appendix.

FIGURE 1

USERS/NON-USERS OF ATMs




* The numbers present: Mean, Variance, Number of cases.

The total effect can be seen from the discriminate functions. While some twenty individual variables were analyzed, only those validly reflecting target market discriminates are not included here.

Location Preference

The only major component of this study requested all to indicate the relative likelihood of their using an automatic teller machine if it were to be located at five specific types of locations. They were also permitted to set down their own personal location preferences. Although 28.6% had actual ATM experience, the range of likelihood of use (very likely + likely) ran from a low of 4.2% to a high of 36.0%. Actual locations preferred by category are shown in Table V.

User Location Preference Traits

The basic data, then, would seem to point to the locations of ATMs in large employment centers and grocery supermarkets as being the most potentially success laden alternatives. Unaided location preferences response trended along similar lines where supermarkets (28.2%), bank lobbies (27.7%) and shopping malls (17.6%) received the highest adjusted frequency response.

TABLE V

PREFERRED ATM LOCATIONS

| Locations | Very Likely | Likely | Unlikely | Very Likely | Not Sure |
|---|---|---|---|---|---|
| Your place of employment | 20.1 | 15.9 | 16.9 | 34.4 | 12.7 |
| Grocery supermarket | 12.0 | 15.3 | 26.1 | 30.6 | 15.9 |
| Convenience store | 2.4 | 2.7 | 27.5 | 61.3 | 6.0 |
| Fast food restaurant | 1.5 | 2.7 | 28.3 | 60.5 | 6.9 |
| Inside a financial institution with an ATMs outside as well | 3.0 | 7.6 | 24.6 | 48.0 | 16.7 |

As before, both MDA and AID were next used to analyze the first three hypothetical locations. Fast food restaurants and interior financial institution sites were purposely reserved for further separate study.

The first possible location to be analyzed was the place of employment. Only one significant discriminatory variable was revealed as is summarized in Table VI. The variable Employment Status is the most discriminatory variable with a negative coefficient,

which is a contradiction to the results shown in the AID, Figure 2. The reason for this is the strong correlation that exists between the variables Employment Status and Size of House (-.37). Separated females and larger size of household seemed to most dislike the idea of location at place of employment. Part of these results can be confirmed very precisely from Figure 2 in which we can see a pattern in Size of Household and Employee Status, but the other variables have no clear pattern. The AID results picked up the variables Size of Household and Employment Status, but chose in addition two more different variables, race and income. While the group of full-time employees were very homogeneity in their answers (181 people, with a mean value of 2.86), it appears to be a great deal of heterogeneity in the not full-time employees. In this group, whites are more likely to accept the idea of location in place of employment than non-whites, and lower income are more likely to accept the idea of locating the ATM in place of employment than higher income (although the differences are very low).

TABLE VI

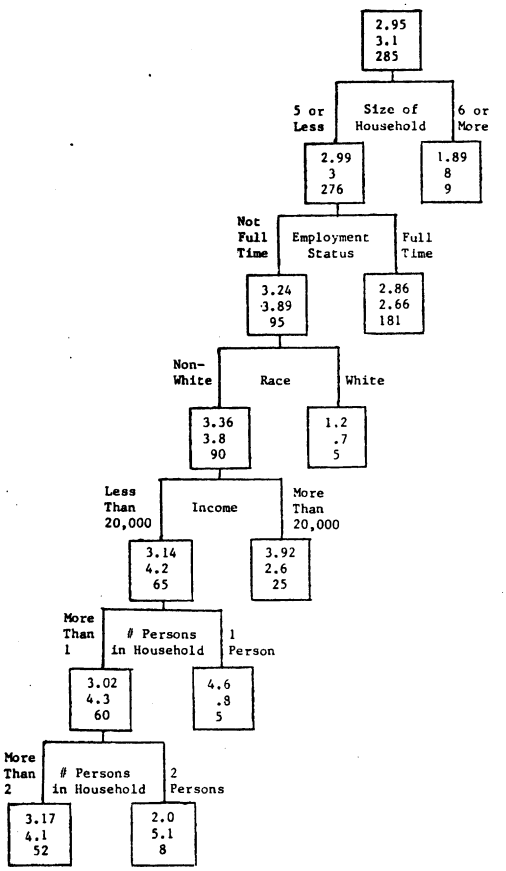
ATTITUDES TOWARD PLACE OF EMPLOYMENT

| λ | Canonical Correlation | Level of Significance | % of Classification |
|---|---|---|---|
| .14 | .36 | .00 | 31 |

Discriminant Function Y = -.8H6 + .47H3 + .45Q3B = .11H1

FIGURE 2

LOCATED IN A PLACE OF EMPLOYMENT




The answers pattern to the question related to the possible location in grocery stores revealed almost the same results as for place of employment, the MDA and AID results are summarized in Table VII and Figure 3. The discriminatory variables and their effects are almost the same except that education variable replaced the sex variable. The higher the education level, then, the more the person disliked the location in a supermarket. Education is an important discriminatory variable, but entered into the splitting process only at the end with few cases. Although from the discriminant function we can deduce that the higher the education level, the more dislike there will be for this location, from the AID (based only on 7 cases), there is definitely infavorite in low educated versus favorness from the highly educated persons. Income and race are significant in the AID process where white and low income are most favorably.

TABLE VII

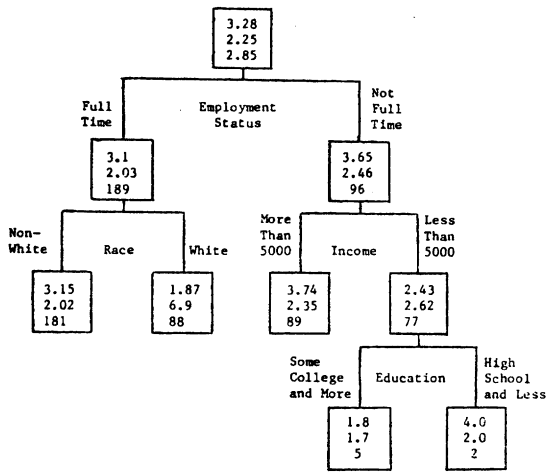
ATTITUDES TOWARD PLACE OF GROCERY

| λ | Canonical Correlation | Level of Significance | % of Classification |
|---|---|---|---|
| .07 | .26 | .01 | 29 |

Discriminant Function Y = -.66H6 + .49H3 + .41Q3B + .32H4

FIGURE 3

LOCATED IN A GROCERY SUPERMARKET




The analysis of the responses to the desirability to locate the ATMs in convenience stores revealed the same variables and the results that were found in the MDA and AID were consistent. The main variables in both techniques were income, race and education. The variable employment status appeared in the MDA and the size of household appeared in AID. Again, we found that the higher educated, full-time employed, white and low income larger households are more favorably disposed.

Conclusion

This study, then, clearly differentiates and clarifies the user/non-user ATM profile and in so doing indicates key target market characteristics which can be incorporated in both promotional and pricing strategy determinations. Moreover, the perceived use potential of

ATMs likely site locations has been measured and similarly profiled. In both instances, MDA and AID have more precisely defined those variables which are most discriminating.

Because this data is a unique analysis of a representative market condition, it is hoped that it will serve as a strategic guideline for those who seek to optimize the implementation and acceptance of this particular type of electronic delivery systems.

## Appendix

H1 = Sex of household 0 - Male 1 = Female
H2 = Age of household head
H3 = Marital status of household head
0 = Married 1 = Otherwise
H4 = Highest level of education of household head
H5 = Race of household head
1 = White 2 = Non-White
H6 = Current employment status
1 = Full-time 2 = Otherwise
Q3B = # of persons in household
Q4 = Total household income