

INFORMATION TO USERS

This reproduction was made from a copy of a document sent to us for microfilming. While the most advanced technology has been used to photograph and reproduce this document, the quality of the reproduction is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help clarify markings or notations which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure complete continuity.
2. When an image on the film is obliterated with a round black mark, it is an indication of either blurred copy because of movement during exposure, duplicate copy, or copyrighted materials that should not have been filmed. For blurred pages, a good image of the page can be found in the adjacent frame. If copyrighted materials were deleted, a target note will appear listing the pages in the adjacent frame.
3. When a map, drawing or chart, etc., is part of the material being photographed, a definite method of "sectioning" the material has been followed. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.
4. For illustrations that cannot be satisfactorily reproduced by xerographic means, photographic prints can be purchased at additional cost and inserted into your xerographic copy. These prints are available upon request from the Dissertations Customer Services Department.
5. Some pages in any document may have indistinct print. In all cases the best available copy has been filmed.

**University
Microfilms
International**

300 N. Zeeb Road
Ann Arbor, MI 48106



Order Number 1330558

**The diffusion and adoption of a technical innovation: The
automated teller machine**

Lozano, Marvin Francis, M.S.

The University of Arizona, 1987

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106



PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy. Problems encountered with this document have been identified here with a check mark .

1. Glossy photographs or pages _____
2. Colored illustrations, paper or print _____
3. Photographs with dark background _____
4. Illustrations are poor copy _____
5. Pages with black marks, not original copy _____
6. Print shows through as there is text on both sides of page _____
7. Indistinct, broken or small print on several pages
8. Print exceeds margin requirements _____
9. Tightly bound copy with print lost in spine _____
10. Computer printout pages with indistinct print _____
11. Page(s) _____ lacking when material received, and not available from school or author.
12. Page(s) _____ seem to be missing in numbering only as text follows.
13. Two pages numbered _____. Text follows.
14. Curling and wrinkled pages _____
15. Dissertation contains pages with print at a slant, filmed as received _____
16. Other _____

University
Microfilms
International



THE DIFFUSION AND ADOPTION OF A TECHNICAL
INNOVATION: THE AUTOMATED
TELLER MACHINE

by

Marvin Francis Lozano

A Thesis Submitted to the Faculty of the
DEPARTMENT OF MANAGEMENT AND POLICY
In Partial Fulfillment of the Requirements
For the Degree of
MASTER OF SCIENCE
In the Graduate College
THE UNIVERSITY OF ARIZONA

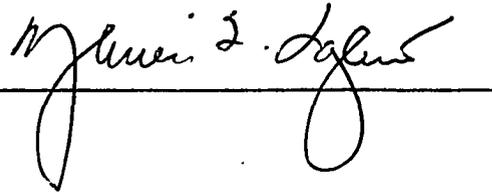
1 9 8 7

STATEMENT BY AUTHOR

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in The University Library to be made available to borrowers under rules of the Library.

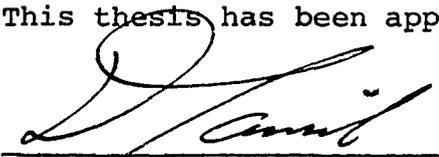
Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

Signed:



APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:



DAVID A. TANSIK
Associate Professor of Management
and Policy

2/9/87

Date

DEDICATION

This thesis is dedicated to God who grants
me the courage to change the things I can,
the serenity to accept the things I cannot,
and the wisdom to know the difference
and
to my Mother and Father.

ACKNOWLEDGMENTS

The author wishes to express his appreciation to his thesis committee composed of Dr. David A. Tansik, Associate Professor Of Management and Dr. Greg Northcraft, Assistant Professor of Management, for their assistance, guidance and moral support in preparation of this research. A special debt of gratitude is due Dr. Tansik for his encouragement, patience, and research suggestions.

Acknowledgment is also made of the encouragement family and friends have given me.

Finally, my thanks go to Donald Mar, M.D., whose continuous support and help made the completion of this research possible and to Byron Bissell, Ph.D., candidate whose guidance proved valuable.

TABLE OF CONTENTS

	Page
LIST OF TABLES	viii
LIST OF ILLUSTRATIONS	ix
ABSTRACT	x
 CHAPTER	
1. INTRODUCTION	1
Social Change	8
Summary and Conclusions	11
2. LITERATURE REVIEW: INNOVATION IN GENERAL	13
Elements in the Diffusion of Innovations	13
Innovation	13
Communication Channels	17
Overtime	18
Among Members of a Social System	22
How Social Structure Affects Diffusion	22
The Effects of Traditional and Modern Norms on Diffusion	23
The Roles of Opinion Leaders and Change Agents	24
Summary	24
Process Approach	26
Summary	32
Innovation Characteristics Influencing Adoption/Rejection	33
Organizational Characteristics Influencing Innovation Adoption	38
Size and Complexity	38
Performance Gap	44
Organizational Slack	50

TABLE OF CONTENTS--Continued

	Page
Hypotheses	54
Hypothesis 1: Size	55
Hypothesis 2: Complexity	56
Hypothesis 3: Performance Gap	57
Hypothesis 4: Organizational Slack	59
3. METHOD	60
Research Method	60
Procedures	60
Surveys	61
Subjects	62
Data Analysis	63
4. RESEARCH RESULTS	65
Statistical Tests of Hypotheses and Results	65
First Hypothesis H ₁	65
Second Hypothesis H ₂	66
Third Hypothesis H ₃	67
Fourth Hypothesis H ₄	70
Supplementary Analysis	74
5. SUMMARY AND CONCLUSIONS	84
Summary of Results	84
Deregulation of the Financial Services Industry	85
Productivity	88
Summary of Supplemental/Analysis Results	90
Deregulation of the Financial Services Industry	91
Productivity	92
Contributions Made by the Research	93
Suggestions for Further Research	95
Conclusion	96
APPENDIX A	97
APPENDIX B	107

TABLE OF CONTENTS--Continued

	Page
APPENDIX C	110
APPENDIX D	111
APPENDIX E	112
APPENDIX F	113
APPENDIX G	114
APPENDIX H	115
LIST OF REFERENCES	117

LIST OF TABLES

Table	Page
1. ATM Shipments, January 31, 1984	4
2. Top Proprietary ATM Programs, January 31, 1984	5
3. Definitions of Organizational Slack	51
4. Size	66
5. Complexity	67
6. Loans	68
7. Deposits	69
8. Net Profit	70
9. Capital Surplus	72
10. Retained Earnings	72
11. Results of the Statistical Analyses, and the Pattern of Results	73
12. Size	76
13. Complexity	78
14. R Loans	79
15. R Deposits	80
16. R Profit	81
17. Capital Surplus	83
18. Retained Earnings	83

LIST OF ILLUSTRATIONS

	Page
Figures	
1. Types of Innovations	16
2. Process of Innovation Model	27
3. Stages in the Innovation Process in Organizations	47

ABSTRACT

It is believed that the commercial banking organizations that survive today and in the future, either through merger or independently adapting to change, will need to recognize the importance of being innovative and adopt technology that will increase their productivity. The research was conducted via a national mail survey of five hundred commercial banks in both branch and unit banking states. Interpretation of the data was based on t-tests. The statistical analysis did not indicate significant differences between the early and late adopters nor did a supplementary analysis provide significant differences when analyzing branch banking states as a subset and unit banking states as another subset. The researcher attributes the equivocal findings to two factors:

- Deregulation of the financial services industry, and
- Productivity.

Suggestions for further research are presented, and it is concluded that the diffusion and adoption of a technical innovation, the automated teller machine, is a worthwhile area of study.

CHAPTER 1

INTRODUCTION

The financial services industry has recently experienced a variety of changes as a result of government deregulation and subsequent increased competition.

Throughout the 1970s, bankers were gripped by a driving dream: Give us low inflation and deregulation, they said, and the world will be ours. In the 1980s, bankers are getting much of what they wanted, and so far it has caused unimagined turmoil.¹

Some organizations in the financial services industry have failed to survive, some have merged with more innovative organizations, and others have independently adapted to change by becoming more innovative.

According to Naisbitt (1982), the mid-to-late-1980's will witness many bank mergers and bank failures. However, contrary to the depression years when bank failures meant the end of the world, deposits were not insured by the Federal Deposit Insurance Corporation nor did the "Fed" or Federal Reserve exist to regulate, today bank failures are not as final. Rather, the opportunity for merger and thus survival is expected by some bankers.

¹"Behind the Banking Turmoil," Business Week, October 29, 1984, p. 100, No. 2866, McGraw-Hill.

It is this researcher's belief that the commercial banking organizations that survive today and in the future, either through merger or independently adapting to change, will need to recognize the importance of being innovative and adopt technology that will increase their productivity.

Productivity is a word of many different meanings. It is often treated as a mechanical issue of input and output, reflected in accounting costs of the products turned out. This sort of productivity is the result of the confusion of efficiency with effectiveness. As Peter Drucker has pointed out, efficiency is doing things right; effectiveness is doing the right things (Kanter, 1983).

In the new climate of banking, the aspect of productivity that needs serious attention is not the mechanical output of a production facility; it is, rather, the capacity of the organization to satisfy customer needs most fully with whatever resources it has at its disposal. This may require modification of the product, development of entirely new products, or changes in the ways they are delivered to customers.

One such resource is the use of new technology in order to deliver traditional as well as new products and services to the customer. In the banking industry, the most important and visible form of new technology is the automated teller machine.

The definition used here of technical versus administrative innovation is taken from Evan (1966). A technical innovation is an idea for a new product, process or service. An administrative innovation pertains to the policies of recruitment, allocation of resources, and the structuring of tasks, authority and reward.

Zimmer (1981) indicates that automated teller machines (ATMs) continue to be a growth industry and are anticipated to remain so in the foreseeable future. The continuing increase in ATM installations is fueled by such factors as the interest of thrift institutions in coupling NOW accounts with ATMs; the explosion of virgin ATM marketplaces such as in California and Texas; the rapid expansion of present bank third-party networks as well as the entry of new third parties in the marketplace; the interest of small banks as rapidly expanding ATM networks in their marketplaces begin to make a competitive difference; and the actual effect ATMs are having on teller staffing requirements, transaction costs, and competitive strategies.

In some more recent work Zimmer (1984) describes 1983 as not being a quiet year for ATM shipments, as a record-breaking 13,983 machines were shipped out by manufacturers, bringing the cumulative domestic machine shipment total to 53,332 (see Tables 1 and 2).

Table 1. ATM Shipments, January 31, 1984

Year	Annual	Cumulative	Net Installed
1973	935	1,935	1,935
1974	965	2,900	2,900
1975	1,156	4,056	4,056
1976	1,249	5,305	5,305
1977	2,444	7,749	7,748
1978	2,001	9,750	9,750
1979	4,680	14,430*	13,800*
1980	5,428	19,858*	18,500*
1981	8,456	28,314*	25,790*
1982	11,035	39,349*	35,721*
1983	13,983	53,332*	48,118*

*Cumulative shipments and net installed base began differing in 1979 due to warehousing, replacement and scrapped machines.

Source: Zimmer (1984), p. 25

Table 2. Top Proprietary ATM Programs, January 31, 1984*

Bank	Number of ATMs
1. Bank of America	959
2. First Interstate Bancorporation	820
3. Michigan National Corp.	770
4. Wells Fargo Bank	739
5. Royal Bank of Canada	602
6. Citicorp	561**
7. Security Pacific	490
8. Mellon National Corp.	464

*For purposes of this February 2, 1984 telephone survey, a proprietary program could include a bank or holding company that belonged to a regional or national network. However, only the machines installed by that bank or holding company for its own customers were counted, just as if it did not belong to a network.

**The installed base for Citicorp is unconfirmed but felt to be extremely close to the actual number.

Source: Zimmer (1984), p. 25

Ballard (1984) describes the automated teller machine as one of the more visible elements in the evolution of banking from a paper based operation to an electronic one. According to Ballard, the ATM has proven to be a great convenience to many bank clients due to its ability to process deposits, withdrawals, transfers and bill payments, without regard for traditional bank holidays and banking hours. It is capable of handling more than 10,000 transactions monthly, or about four times the number that a human teller can process, the ATM also has the mechanical good fortune of rarely making a mistake, and never getting into an argument with a customer.

The financial services industry has experienced a variety of changes as a result of government deregulation and subsequent increased competition.

Naisbitt (1982) suggests that the next few years will witness many bank mergers and bank failures unless banks reconceptualize what business they are in. The question for the 1980s is "What business are you really in" (p. 85)? When the business environment changes, a company or organization must reconceptualize its purpose in light of the changing world. The great business lesson of unrecognized obsolescence is not the buggy whip, it's the railroads. Naisbitt asks us to suppose that somewhere along the way a railroad, sensing the changes in its

business environment, had engaged in the process of reconceptualizing what business it was in. Suppose they had said, "Let's get out of the railroad business and into the transportation business" (p. 86). They could have created systems that moved goods by rail, truck, airplane, or in combination, as appropriate. Instead, they continued to be transfixed by the love of railroading that had served the country so well--until the world changed.

Naisbitt (1982) further writes that of this phenomenon Walter B. Wriston, chairman of Citicorp, in 1981 said:

The philosophy of the divine right of kings died hundreds of years ago, but not, it seems, the divine right of inherited markets. Some people still believe there's a divine dispensation that their markets are theirs--and no one else's--now and forevermore. It is an old dream that dies hard, yet no businessman in a free society can control a market when the customers decide to go somewhere else. All the kings horses and all the kings men are helpless in the face of a better product.

Our commercial history is filled with examples of companies that failed to change with a changing world, and became tombstones in the corporate graveyard.

Thus, it is important to better understand what change means if today and the future require it of organizations that desire to survive (Humprey, 1984; Brown and Weiner, 1984). The next section of this chapter presents a construct of social change as a process.

Social Change

Social change is the process by which alteration occurs in the structure and function of a social system (Rogers, 1969).

The process of social change consists of three sequential steps: 1) invention, 2) diffusion, and 3) consequences. Invention is the process by which new ideas are created or developed. Diffusion is the process by which these new ideas are communicated to the members of a social system and, consequences are the changes that occur within a social system as result of the adoption or rejection of the innovation (Rogers and Shoemaker, 1971).

Rogers indicates that when the source of change is from within the social system under analysis, it is immanent change. This refers to the first sequential step in the process of social change, invention; and when the source of the new ideas is outside the social system, it is contact change (Rogers and Shoemaker, 1971).

Selective contact change results when members of a social system are exposed to external influences and adopt or reject a new idea from that source on the basis of their needs. On the other hand, directed contact change, or planned change, is caused by outsiders who, on their own or as representatives of change agencies, intentionally seek

to introduce new ideas in order to achieve goals they have defined (Rogers and Shoemaker, 1971).

Innovations can create social change, and the subsequent social change can bring about additional innovations that can react back upon altered structures and/or functions which brought them into existence or which influence other aspects of the organization. New ideas can originate from within or from without the social system (Zaltman, Duncan and Holbeck, 1973).

The second sequential step in the process of social change is diffusion. Rogers and Shoemaker (1971) indicate that diffusion is a special type of communication. It is the process by which innovations spread to the members of a social system. Diffusion studies are concerned with messages that are new ideas, whereas communication studies encompass all types of messages.

One of the obvious principles of human communication is that the transfer of ideas occurs most frequently between a source and a receiver who are alike; similar or homophilous. Homophily is defined as the degree to which pairs of individuals who interact are similar in certain attributes, such as beliefs, values, education, social status, and the degree to which pairs of individuals who interact are different in certain attributes (Rogers and Shoemaker, 1971).

According to Rogers and Shoemaker (1971) ". . . the very nature of diffusion demands that at least some degree of heterophily be present between source and receiver."

Rogers and Shoemaker (1971) write that a considerable time lag often exists from the introduction of a new idea to its widespread adoption (diffusion), even when the economic benefits of the innovation are obvious. Classic examples are: 1) more than fourteen years were required for hybrid seed corn to reach complete adoption in Iowa, and 2) U.S. public schools required fifty years to adopt the idea of the kindergarten by the 1930s and 1940s (Ross, 1958).

The third and last sequential step in the process of social change is the consequences of innovations. These are the changes that occur within a social system as a result of the adoption or rejection of an innovation.

It is important to relate the issues of ATMs and social change since the financial services industry has experienced a variety of changes, as a result of government deregulation and increased competition, and change is required today and in the future by organizations that desire to survive. Social change is the process by which alteration occurs in the structure and function of a social system (Rogers, 1969). In the first step of social change, invention; it can be argued that commercial banks need to

be open to new ideas which are created or developed either inside or outside the social system if they are going to adopt technology that will increase productivity. In the second step, diffusion; it can be argued that commercial banks need to recognize the process by which these new ideas spread to the members of its social system since, as Rogers and Shoemaker (1971) indicate, a considerable time lag often exists from the introduction of a new idea to its widespread adoption (diffusion), even when the economic benefits of innovation are obvious. In the third step, consequences; it can be argued that commercial banks need to be aware of the changes that occur within a social system as a result of the adoption or rejection of the innovation. In particular, the consequences of new technology that can deliver traditional as well as new products and services to the customer are important.

Summary and Conclusions

The purpose of this chapter has been to introduce the subject of study in this paper. The financial services industry is experiencing "change" as a result of government deregulation and subsequent increased competition. Further, the next few years will witness many bank failures and bank mergers (Naisbitt, 1982). It is this researcher's belief that the commercial banking organizations that

survive today and in the future, either through merger or independently adapting to change, will need to recognize the importance of being innovative and adopt technology that will increase their productivity if they are to survive. As one potentially important one, the technology studied here is a technical innovation, the automated teller machine. Productivity is a word of many different meanings (Kanter, 1983). The aspect of productivity that concerns us here is not the mechanical output of a production facility; it is, rather, the capacity of the organization to satisfy customer needs most fully with whatever resources it has at its disposal. A construct of social change is presented which helps understand the process that commercial banks in the financial services industry must go through if they are to survive today and in the future.

In the next chapter we review the existing literature on the diffusion of innovations. Then, a process approach is presented in discussing innovations in organizations, innovation characteristics influencing adoption/rejection are listed, organizational characteristics influencing innovation adoption are reviewed, and the hypotheses for this study are presented.

CHAPTER 2

LITERATURE REVIEW: INNOVATION IN GENERAL

Elements in the Diffusion of Innovations

The crucial elements in the diffusion of new ideas, which are similar to the elements listed by Katz and others (1963) as essential in any diffusion study, are: 1) the innovation, 2) which is communicated through certain channels, 3) over time, 4) among the members of a social system (Rogers, 1983).

Innovation

The following material deals with the first of the above elements: the innovation. The term "innovation" is usually employed in three different contexts (see Tilton, 1971, pp. 4-6). In one context, it is synonymous with invention; that is, it refers to a creative process whereby two or more existing concepts or entities are combined in some novel way to produce a configuration not previously known by the person involved. Myers and Marquis (1969) use innovation in this fashion, with an emphasis upon technological development. Their view of innovation as a process starting with the recognition of a potential demand for,

and technical feasibility of, an item and ending with its widespread utilization is perhaps the broadest use of the term innovation in the existing literature. It blends the idea of invention with that of adoption. In another context, "innovation" is used to describe only the process whereby an existing innovation becomes a part of an adopter's cognitive state and repertoire. This is a process of adoption and internationalization. The third use of the term refers to that idea, practice, or material artifact that has been invented or that is regarded as novel independent of its adoption or nonadoption. The emphasis here is on a description of why something is novel, whereas invention and adoption involve processes (Zaltman et al., 1973).

Rogers (1983) defines innovation as an idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behavior is concerned, whether or not an idea is "objectively" new as measured by the lapse of time since its first use or discovery. The perceived newness of the idea for the individual determines his or her reaction to it. If the idea seems new to the individual, it is an innovation.

In this paper "innovation" is used to describe a process whereby an existing technology, an automated teller

machine, becomes part of an adopter's cognitive state and repertoire. The adopter is defined as the decision makers within the commercial bank.

In previous studies, the adopting unit varies from those such as a single individual to a business firm, a city (Crain, 1966), or a state legislature (Walker, 1969).

Further, treatment of innovation will follow what Zaltman et al. (1973) call the "individual-oriented approaches which emphasize newness." For example, Walker (1969) in his study of the diffusion of ideas for new services or programs in the United States, defines an innovation as "a program or policy which is new to the states adopting it, no matter how old the program may be or how many other states may have adopted it" (p. 881).

Becker and Whisler (1967, p. 463) although talking about innovation as a process, suggest "defining innovation as the first or early use of an idea by one of a set of organizations with similar goals" (Zaltman et al., 1973).

Figure 1 summarizes the various types of innovations discussed by Zaltman et al. (1973). The figure categorizes the types of innovations into the following three groups:

- 1) types of innovations in terms of the state of the system,
- 2) types of innovations in terms of their initial focus,
- and 3) types of innovations in terms of their outcome or effect.

Types of innovations in terms of the state of the system

- 1. Programmed innovations
 - 2. Nonprogrammed innovations
 - (a) Slack innovations
 - (b) Distress innovations
- Cyert and March, 1963
- Knight, 1967

Types of innovations in terms of their initial focus

- 1. Technological innovations
 - 2. Value-centered innovations
 - 3. Structural (administrative innovations)
- Dalton et al., 1968
- 1. Product or service innovations
 - 2. Production process innovations
 - 3. Organizational-structure innovation
 - 4. People innovation
- Knight, 1967
- (a) Ultimate innovation
 - (b) Instrumental innovation
- Grossman, 1970

Types of innovations in terms of their outcome or effect

- 1. Performance radicalness
 - 2. Structural radicalness
- Knight, 1967
- (i) Large scale
 - (ii) Small scale
- Harvey and Mills, 1970
- 1. Variations (imply minor changes)
 - 2. Reorientations (imply major changes)
 - (a) Systematic reorientations
 - (b) Idiosyncratic reorientations
 - (c) Marginal reorientations
- Normann, 1971

Figure 1. Types of Innovations. -- Source: Zaltman et al. (1973), p. 31.

Communication Channels

A communication channel is the means by which the message gets from the source to the receiver. At its most elementary level, the diffusion process consists of: 1) a new idea, 2) individual A who has knowledge of the innovation, 3) individual B who is not yet aware of the new idea; and 4) some sort of communication channel connecting the two individuals. If A wishes simply to inform B about the innovation, mass media channels are often the most rapid and efficient, especially if the number of B's in the audience is large. On the other hand, if A's objective is to persuade B to form a favorable attitude toward the innovation, an interpersonal channel is more effective (Rogers and Shoemaker, 1971).

Mass media channels are all those means of transmitting messages that involve a mass medium, such as radio, television, newspapers, and so on which enable a source of one or a few individuals to reach an audience of many. On the other hand, interpersonal channels are more effective in persuading an individual to adopt a new idea, especially if the interpersonal channel links two or more individuals who are near peers. Interpersonal channels involve a face-to-face exchange between two or more individuals (Rogers, 1983).

An obvious principle of human communication is that the transfer of ideas occurs most frequently between two individuals who are alike, similar, or homophilous. Homophily is the degree to which pairs of individuals who interact are similar in certain attributes, such as beliefs, education, social status, and the like (Rogers, 1983).

Overtime

Rogers and Shoemaker (1971) indicate that time is an important consideration in the process of diffusion. Further, they indicate that the time dimension is involved: 1) in the innovation-decision process by which an individual passes from first knowledge of the innovation through its adoption or rejection, 2) in the innovativeness of the individual, that is, the relative earliness-lateness with which an individual adopts an innovation when compared with other members of the social system, and 3) in the innovation's rate of adoption in a social system, usually measured as the number of members of the system that adopt the innovation in a given time period.

The innovation-decision process is the mental process through which an individual passes from first knowledge of an innovation to a decision to adopt or reject and to confirmation of this decision. Zaltman et al. (1973) constructed an organizational model of the innovation

process which is discussed in the next section of this chapter, however here we are concerned with the mental process through which an individual goes through. Rogers (1962) utilizes the following five stages: 1) from awareness, 2) to interest, 3) to evaluation, 4) to small scale trial, and 5) to an adoption or rejection decision. The innovativeness decision period is the length of time required to pass through the innovation-decision process.

Rogers and Shoemaker (1971) define innovativeness as the degree to which an individual is relatively earlier in adopting new ideas than other members of his system. "Relatively earlier" is meant to be earlier in terms of actual time of adoption, rather than whether the individual perceives he adopted the innovation relatively earlier than others in his system.

The continuum of innovativeness can be partitioned into five adopter categories: 1) innovators, 2) early adopters, 3) early majority, 4) late majority, and 5) laggards.

According to Rogers (1983), these categories are ideal types, conceptualizations based on observations of reality and designed to make comparisons possible. Dominant attributes of each category are: innovators--venturesome; early adopters--respectable; early majority--deliberate; late majority--skeptical; and laggards--traditional.

Innovators are eager to try new ideas. This interest leads them out of a local circle of peer networks and into more cosmopolite social relationships. Communication patterns and friendship among a clique of innovators are common, even though the geographical distance between the innovators may be considerable. Being an innovator has several prerequisites. These include control of substantial resources to absorb the possible loss owing to an unprofitable innovation and the ability to understand and apply complex technical knowledge. The innovator must be able to cope with the high degree of uncertainty about an innovation at the time that the innovator adopts (Rogers, 1983).

Early adopters are a more integrated part of the local social system than are innovators. Whereas innovators are cosmopolites, early adopters are localites. This adopter category, more than any other, has the greatest degree of opinion leadership in most social systems. Potential adopters look to early adopters for advice and information about the innovation. The early adopter is considered by many as "the individual to check with" before using a new idea (Rogers, 1983).

The early majority adopt new ideas just before the average member of a social system. The early majority interact frequently with their peers, but seldom hold leadership positions. The early majority's unique position

between the very early and the relatively late to adopt makes them an important link in the diffusion process. They provide interconnectedness in the system's networks (Rogers, 1983).

The late majority adopt new ideas just after the average member of a social system. Adoption may be both an economic necessity and the answer to increasing network pressures. Innovations are approached with a skeptical and cautious air, and the late majority do not adopt until most of the others in their social system have done so (Rogers, 1983).

Laggards are the last in a social system to adopt an innovation. They possess almost no opinion leadership. They are the most localite in their outlook of all adopter categories; many are near isolates in social networks. The point of reference for the laggard is the past (Rogers, 1983).

Rogers and Shoemaker (1971) indicate that rate of adoption is the relative speed with which an innovation is adopted by members of a social system. These authors indicate that rate of adoption is usually measured by the length of time required for a certain percentage of the members of a system to adopt an innovation. Therefore, rate of adoption is measured using an innovation or a system, rather than an individual, as a unit of analysis.

Among Members of a Social System

Rogers and Shoemaker (1971) suggest that a social system is a collectivity of units which are functionally differentiated and engaged in joint problem solving with respect to a common goal. The members or units, of a social system may be individuals, informal groups, complex organizations, or subsystems.

How Social Structure Affects Diffusion

Social structure develops through the arrangement of the statuses or positions in a system. A formal organization such as a government agency has a well-developed formal social structure consisting of titled positions, giving those in a higher ranked status the right to give orders to those of lesser rank and to expect the orders to be carried out. Even an informal grouping has some degree of structure inherent in the interpersonal relationships among its members, determining who interacts with whom and under what circumstances. Naturally, both formal and informal social structures have an effect on human behavior and how it changes in response to communication stimuli (Rogers and Shoemaker, 1971).

The social structure acts to impede or facilitate the rate of diffusion and adoption of new ideas through what are called "system effects." The basic notion of

system effects is that the norms, social statuses, hierarchy, and so on of a social system influence the behavior of individual members of that system. System effects are the influences of the system's social structure on the behavior of the individual members of the social system. In the case of innovation diffusions, one can conceptualize an individual's innovation behavior as explained by two types of variables: 1) the individual's personality, communication behavior, attitudes, and so on, and 2) the nature of the social system.

The Effects of Traditional and Modern Norms on Diffusion

Rogers and Shoemaker (1971) conceptualize system norms that are most relevant for innovation diffusion as either traditional or modern. They view modern norms as more change oriented, technologically developed, scientific, rational, cosmopolite, and empathetic. A traditional system embodies the opposite characteristics. Further, not only is the traditionalism-modernism of a social system's norms important in predicting individual diffusion behavior, but also the commitment of the individual to the social system affects his conformity to its norms.

The Roles of Opinion Leaders and Change Agents

Opinion leadership is the degree to which an individual is able to informally influence other individual's attitudes or overt behavior in a desired way with relative frequency. Further, it is a type of informal leadership, rather than being a function of the individual's formal position or status in the system. It is earned and maintained by the individual's technical competence, social accessibility, and conformity to the system's norms. Several researchers indicate that when the social system is "modern," the opinion leaders are quite innovative; but when the norms are "traditional," the leaders also reflect this norm in their behavior (Rogers and Shoemaker, 1971).

A change agent is a professional who influences innovation-decisions in a direction deemed desirable by a change agency. He usually seeks to obtain the adoption of new ideas, but he may also attempt to slow down diffusion and prevent the adoption of what he believes are undesirable innovations (Rogers and Shoemaker, 1971).

Summary

In summary, this section of Chapter 2 presents four elements similar to those listed by Katz and others (1963) which Rogers (1983) considers crucial to the diffusion of new ideas. In this paper "innovation" is used to

describe a process whereby an existing technology, an automated teller machine, becomes part of an adopter's cognitive state and repertoire. Figure 1 categorizes the types of innovations as discussed by Zaltman et al. (1973). Then, two ways of communicating the innovation are identified. One way is to use mass media if A wishes simply to inform B about the innovation, especially if the number of B's in the audience is large. Another way, which may be more appropriate for this study, is if A's objective is to persuade B to form a favorable attitude toward the innovation, an interpersonal channel is more effective. Third, Rogers and Shoemaker (1971) indicate that time is an important consideration in the process of diffusion. They indicate that the time dimension is involved in the innovation-decision process by which an individual passes from first knowledge of the innovation through its adoption or rejection. Further, they indicate that the time dimension is involved in the innovativeness of the individual, that is, the relative earliness-lateness with which an individual adopts an innovation when compared with other members of the social system. In this study we are interested in the innovativeness of commercial banks and look at the relative earliness-lateness with which a bank adopts an innovation when compared with other members of the social system. Rogers and Shoemaker (1971) indicate

that time is an important consideration in the innovation's rate of adoption in a social system, usually measured as the number of members of the system that adopt the innovation in a given time period. Finally, they define a social system as a collectivity of units which are functionally differentiated and engaged in joint problem solving with respect to a common goal. The members or units, of a social system may be individuals, informal groups, complex organizations, or subsystems. In this study the "units" can be viewed as complex organizations, commercial banks.

Process Approach

In this paper a process approach is used in discussing innovations in organizations. Zaltman et al. (1973) refer to the process approach of innovation as being composed of a set of stages or phases ordered along the temporal dimensions of their anticipated sequence. They have constructed an organizational model of the innovation process (see Figure 2). Although other organizational models have been constructed by other researchers, the following material concerns Zaltman et al. (1973).

The process of innovation may be seen as composed of two major stages with three and two respective sub-stages.

- I. Initiation stage
 - 1. Knowledge-awareness substage
 - 2. Formation of attitudes toward the innovation substage
 - 3. Decision substage
- II. Implementation stage
 - 1. Initial implementation substage
 - 2. Continued-sustained implementation substage

Figure 2. Process of Innovation Model. -- Source:
Zaltman et al. (1973), p. 62.

The initiation stage, which is the first major stage of the innovation process, is concerned with problem solving or decision making.

The knowledge-awareness substage of the initiation stage, illustrates that before any innovation can take place or be adopted, potential adopters must be aware that the innovation exists and that there is an opportunity to utilize the innovation in the organization. The formation of attitudes toward the innovation substage of the initiation stage, illustrates that organizational members form attitudes toward the innovation (Zaltman and Brooker, 1971; Rogers and Shoemaker, 1971). Openness to the innovation and potential for innovation are two important attitudinal dimensions that organizational members can exhibit about the innovation according to Duncan (1972). First, is openness to innovation. Important components of openness to innovation are: 1) whether organizational members are willing to consider innovation, 2) whether they are skeptical about the innovation, 3) whether they feel the innovation will improve how the organization carries out its function. Second, is potential for innovation. This attitudinal dimension focuses on whether organizational members perceive that: 1) there is some capability within the organization for utilizing the innovation, 2) the organization has had some success in the past in utilizing

innovations, 3) there is some commitment on the part of organizational members to working for the innovation and dealing with some of the potential problems that might arise as implementation is attempted. In the decision substage of the initiation stage, the information concerning the potential innovation is evaluated. If organizational decision makers are highly motivated to innovate and/or their attitudes are favorable regarding the innovation, there is likely to be a favorable attitude to implement the innovation. On the other hand, if there is not much motivation to innovate and/or the attitudes toward the innovation are not favorable, there is a greater likelihood that the innovation will not be implemented (Zaltman et al., 1973).

The implementation stage, which is the second major stage of the innovation process, is concerned with the actual utilization of the innovation by organizational members as they perform their tasks.

The initial implementation substage of the implementation stage, is the point where the organization makes the first attempt to utilize the particular innovation. This substage involves some trial of the potential adoption (see Bean, 1972; Radnor, Rubenstein and Bean, 1968; Radnor, Rubenstein and Tansik, 1970). The continued-sustained implementation substage of the implementation stage, is the continuation of the implementation process given that

organizational members understand it, have information about implementation, and experienced few significant problems (Zaltman et al., 1973).

There are two major classes of innovation decisions in organizations: 1) authority decisions and collective decisions. Zaltman et al. (1973) view this basis of categorization as the degree to which members of the unit can participate in the various subphases of the major stage of initiation.

Rogers and Shoemaker (1971) view the innovation decision as being forced upon the members of the adoption unit by someone in a superordinate power position in writing about authority decisions. Further, they distinguish between two types of authority decisions: a) authority decisions with member participation (the participative approach); and b) the authority decisions without member participation (the authority approach).

According to Zaltman et al. (1973), decision by authority is usually regarded as efficient because the sequencing through the subphases of the initiation stage, and thus the implementation decision can be made within a relatively short period of time, Rogers and Shoemaker (1971) hypothesize that the rate of adoption (up to and including the implementation decision) is faster by the

authoritative approach than by the participative approach. Further, they indicate that changes brought about by the authoritative approach are more likely to be discontinued than those brought about by the participative approach.

In contrast to authority decisions (without participative management) which are made by an individual or by a small group that is often called the "dominant coalition" (Thompson, 1967), collective decisions are made by all or a majority of the adoption unit's members. This means that for collective decisions, political processes are at work during the decision subphases of initiation. Here the choice between alternatives (including the implementation stage) is basically a question of winning approval for an alternative, which involves political processes of conflict and bargaining (Wilson, 1966). For authority decisions, on the other hand, the conflicts occur mainly during the implementation stage and often involve resistance to change (Zaltman et al., 1973).

In regard to collective decisions, Schien (1969) notes that decisions made by majority rule are "surprisingly often" not well implemented even by the group that made the decision because of psychological barriers that are likely to lead to implementation problems. He suggests that decision by consensus is more effective. Here

participants believe that the communication processes and group climate have been such that each member feels he has had a fair chance to influence the decision process.

Summary

In summary, this section of Chapter 2 uses a process approach in discussing innovations in organizations. A model is presented which identifies two major stages with three and two respective substages. It is with the initiation stage, which is the first major stage of the innovation process concerned with the problem solving or decision making, that this research is most concerned. The knowledge-awareness substage of the initiation stage illustrates that before any innovation can take place or be adopted, potential adopters, commercial bank organizations in this study, must be aware that the innovation exists and that there is an opportunity to utilize the innovation in the organization. Further, the formation of attitudes toward the innovation substage illustrates that organizational members form attitudes toward the innovation (Zaltman and Brooker, 1971; Rogers and Shoemaker, 1971). It can be argued that openness to a technical innovation; an ATM, and potential for the technical innovation are two

important attitudinal dimensions that organizational members can exhibit (Duncan, 1972). According to Zaltman et al. (1973), it is in the decision substage of the initiation stage, where information concerning the potential innovation is evaluated. If organizational decision makers are highly motivated to innovate and/or their attitudes are favorable regarding the innovation, there is likely to be a favorable attitude to implement the innovation. On the other hand, if there is not much motivation to innovate and/or the attitudes toward the innovation are not favorable, there is a greater likelihood that the innovation will not be implemented. Of particular interest to this researcher is to scientifically determine whether the organizational decision makers of a commercial bank are highly motivated to innovate and/or their attitudes favorable regarding the adoption of technology; specifically, the ATM.

Innovation Characteristics Influencing Adoption/Rejection

In the following material we focus on characteristics that innovations of various types possess and that are known to influence their adoption or rejection. It is important to understand that the various types of innovations can possess a varied combination of the following characteristics.

Rogers (1962) and Rogers and Shoemaker (1971) list five major characteristics of innovations, as sensed by receivers, that contribute to rate of adoption:

1. Communicability (Rogers, 1962) or Observability (Rogers and Shoemaker, 1971): The degree to which results of an innovation may be diffused to others (Rogers, 1962). The degree to which the results of an innovation are visible to others (Rogers and Shoemaker, 1971).

2. Compatibility (Rogers, 1962; Rogers and Shoemaker, 1971): The degree to which an innovation is consistent with existing values and past experiences of the adopters (Rogers, 1962). The degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of the receivers (Rogers and Shoemaker, 1971).

3. Complexity (Rogers, 1962; Rogers and Shoemaker, 1971): The degree to which an innovation is relatively difficult to understand the use (Rogers, 1962). The degree to which an innovation is perceived as difficult to understand and use (Rogers and Shoemaker, 1971).

4. Divisibility (Rogers, 1962) or Trialability (Rogers and Shoemaker, 1971): The degree to which an innovation may be tried on a limited basis (Rogers, 1962). The degree to which an innovation may be experimented with on a limited basis (Rogers and Shoemaker, 1971).

5. Relative Advantage (Rogers, 1962; Rogers and Shoemaker, 1971): The degree to which an innovation is superior to ideas it supercedes (Rogers, 1962). The degree to which an innovation is perceived as better than the idea it supercedes (Rogers and Shoemaker, 1971).

Rogers refers to the five characteristics just described as the most important characteristics of innovations based on past research.

Zaltman et al. (1973) add to the five characteristics when discussing characteristics of an innovation that make the innovation more or less attractive and thus more or less likely to be utilized by an organization:

6. Cost: Cost factors involve two elements, the economic and the social.

7. Return on Investment: It is obvious that innovations will be selected which will yield high returns on investments.

8. Efficiency: The more efficient innovation will be selected over a less sufficient status quo situation or alternative innovation.

9. Risk and Uncertainty: The less the risk and uncertainty, the greater the likelihood of adopting an innovation.

10. Scientific Status: If an innovation is perceived as having sound scientific status, it is more likely to be adopted.

11. Point of Origin: Innovations are more likely to be adopted if they originate within the organization.

12. Terminality: This involves the timing of the innovation.

13. Commitment: This involves behaviors and attitudes toward the innovation.

14. Interpersonal Relations: If an innovation or technological policy is likely to be disruptive to interpersonal relationships, it is less likely to be adopted.

15. Publicness versus Privatness: If an innovation is likely to affect a large part of the public, it will typically involve a larger decision-making body than an innovation that is limited to a private party.

16. Gatekeepers: This refers to the issue of whether or not an innovation must pass through several steps of approval or only one or two. The greater the number of gatekeepers, the more likely that an innovation will be turned down.

17. Susceptibility to Successive Modification: If an innovation itself can be modified as conditions of the technology itself changes, it stands more chance of adoption.

18. Gateway Capacity: The adoption of one innovation or the development of a technological policy is likely to lead to the capacity to involve the organization in additional such actions.

19. Gateway Innovations: This refers to the fact that some innovations, even small changes in an organization's structure, can have the effect of paving the way for additional innovations.

In summary, the former characteristics of innovations, based on past research (Rogers, 1962; Rogers and Shoemaker, 1971; Zaltman et al., 1973), are important because they contribute towards making the innovation more or less likely to be utilized by an organization. In this study we are specifically concerned with the diffusion and adoption of a technical innovation, the ATM in banks. However, the researcher would be remiss if these characteristics that influence an innovation's adoption or rejection were not identified.

The next section of this chapter specifically identifies organizational characteristics that influence innovation adoption that are of interest in this study.

Organizational Characteristics
Influencing Innovation
Adoption

Size and Complexity

The size of an organization has consistently been found to be positively related to its innovativeness. Mytinger (1968) found that the innovativeness of forty local health departments in California was related to: 1) their bigness in staff and budget, which in turn rested on, 2) the size of the city they served, and 3) the cosmopolitaness, accreditation, and prestige of the health director among his or her peer health officials. Similar evidence for the importance of size as a predictor of organizational innovativeness is provided by Mohr (1969), Kaluzny et al. (1973), and Mansfield (1963a).

Some of the earliest work was carried out by an economist concerned with innovation among economic enterprises (Mansfield, 1961, 1963a, 1963b, and 1963c). Mansfield (1963c) found that although it is often alleged that the largest firms introduce a disproportionately large share of innovations, this is not always the case. In petroleum refining and bituminous coal, the largest four firms accounted for a larger share of the innovations than they did of the market. But in steel they accounted for less. Further, the largest four firms seemed to account

for a relatively large share of the innovating cases where: 1) the investment required to innovate was large relative to the size of the potential users, 2) the minimum size of firm required to use the innovations profitably was relatively large, and 3) the average size of the largest four firms was much greater than the average size of all potential users of the innovations.

According to Evan (1966), a technical innovation is an idea for a new product, process, or service. An administrative innovation pertains to the policies of recruitment, allocation of resources, and the structuring of tasks, authority and reward.

In Fennell (1984) the adoption of two related administrative innovations in the private sector were examined: 1) employee assistance and/or alcoholism counseling programs, and 2) the provision of insurance coverage for alcoholism treatment of employees.

Considering the adoption of insurance first, firm size and complexity reached acceptable levels of significance. It was found that larger and more complex firms are more likely to provide insurance coverage for alcoholism treatment. Employee assistance and/or alcoholism counseling programs via the adoption of in-house programs was significantly affected by firm size. However, complexity did not significantly affect adoption of in-house programs.

Firm size was measured as the number of employees. Complexity was measured as the number of job categories reported by the firm.

Baldrige and Burnham (1975) examined the impact of individuals, structure, and environment on innovation in schools. They found that individual characteristics, such as sex, age, and personal attitudes, do not seem to be important determinants of innovative behavior among people in complex organizations. However, administrative positions and roles do seem to have an impact on the involvement of an individual in the innovative process. Further, results showed that structural characteristics such as size and complexity strongly affect the organization's innovative behavior. Size was measured by number of students and number of administrative components. Complexity was measured by job specialization and conflict-prevention committees.

In Mahajan and Schoeman (1977) data were collected for 367 hospitals which consisted of 117 adopters and 250 nonadopters of computer use.

The central hypothesis and focus of discussion was that the differences between the adopters and nonadopters can be attributed to factors belonging to one of three categories: a) the characteristics of hospitals, b) the environment in which a hospital operates, and c) the

characteristics of the hospital administrator. These three factors are also suggested in other research conducted on the diffusion of innovations in the health system dealing with programmatic services (Kaluzny, 1974; Kaluzny and Sprague, 1974).

The results showed that hospitals that have adopted computers characteristically are the larger, more technically equipped ones with greater financial resources to devote in their operations. An extremely large percentage of the adopters (77%) are located in an SMSA, but hospitals in SMSA's represent only 47% of all hospitals; thus, efforts to restructure the availability of computer services on a collectively shared basis for the rural hospitals may prove fruitful. The hospital administrator's background and education were found to be limited in impacting computer adoption.

Kimberly (1978) presented a paper which sought to identify some of the kinds of mechanisms through which information about innovation might enter the organizational system and how, if at all, the existence of these mechanisms is related to the actual adoption of innovations.

The principal hypothesis was that the greater the extent of hospital integration into informational environments, the more extensive would be the hospital's response to environmental change, i.e., the more likely it would be

to adopt innovations. Organizational size, operationally defined here as the number of beds in the hospital, was included as an independent predictor of innovation, although no hypotheses were formulated regarding the direction of its effects.

The hypothesis was tested using mail-survey data from a national sample of hospitals. A central interest in the study was to examine adoption behavior comparatively, across a sample of organizations.

The results showed that the number of paid outside speakers, hospital reimbursement for travel expenses, and physician publication, all have significant positive relationship with innovation as hypothesized. However, organizational size was interpreted as having a negligible effect on amount of innovation.

Interestingly, in Kimberly and Evanisko (1981), organizational level variables, and size in particular, were better predictors of both technological and administrative innovations than either individual or contextual level variables.

In summary, in the studies reviewed, size and complexity are the two organizational variables that are consistently found to influence the adoption of an innovation. Fennell (1984) found that larger and more complex

firms are more likely to provide insurance coverage for alcoholism treatment. Large firms were found to significantly affect adoption of employee assistance and/or alcoholism counseling programs. However, complexity did not significantly affect adoption of in-house employee assistance and/or alcoholism counseling programs. In a classic study, Baldrige and Burham (1975) found that size and complexity strongly affected the school's innovative behavior. Size was measured by number of students and number of administrative components. Complexity was measured by job specialization and conflict-prevention committees. The Bay area schools and school districts showed a perfect rank order between increasing district size and increased adoption of innovations. In the individual schools the ten largest schools had more than three times as many major innovations listed as the ten smallest schools. In the Illinois study, when districts were separated into high adopters and low adopters of innovation, the high adopters were larger and structurally more complex than the low adopters. There were nearly twice as many students, 50 percent more administrative positions, twice as many full-time administrators, and about 25 percent more conflict-prevention devices. In Mahajan and Schoeman (1977), the results showed that hospitals that have adopted computers are the larger, more technically equipped ones with

greater financial resources to devote to their operations. Specifically, they are likely to have large bed size, higher census, higher percent occupancy, a greater number of total facilities and advanced technological facilities, and higher total expenses per bed. However, in Kimberly (1978) the structural attribute included in the analyses, number of beds (an indicator of hospital size), was interpreted as having a negligible effect on amount of innovation. Finally, Kimberly and Evanisko (1981) again find size a predictor of innovation.

The researcher suspects that size is related to innovation due to economies of scale, less relative exposure on the part of larger units, and different attitudes toward new technology on the part of managers of larger units.

Performance Gap

In Downs (1967), a basic model of search and change for both individuals and organizations is presented. His theory proposes that whenever the actual behavior of an official yields him less utility than the relevant level of satisfactory performance, he is motivated to undertake more intensive search for new forms of behavior that will provide him with more utility. He will designate the difference in utility he perceives between the

actual and the satisfactory level of performance as the performance gap.

Downs identifies four major classes of events that can cause performance gaps to arise in the eyes of bureau members: 1) inevitable internal turnover, 2) internal technical changes, 3) external changes, and 4) repercussions of a bureau's performance of its functions. I find "external changes" particularly interesting in relationship to this study. This classification of events that can cause performance gaps to "arise in the eyes of bureau members" is further divided, according to Downs, into the following three types of changes: a) shifts in the relative importance of the bureau's social function, b) external technical changes, and c) changes in the bureau's power setting. Specifically, Downs defines external technical changes as changes in technology occurring outside a bureau possibly affecting the nature of its functions and therefore its behavior. An example is that the development of branch banking has made it harder for police to prevent robberies. In this study, changes in technology can be viewed as the deregulation of the financial services industry. The changes in technology can be viewed as occurring outside a commercial bank yet affecting the nature of its functions and therefore its behavior. Adoption of technical innovations, such as, the

automated teller machine, is an example. This analogy is appropriate given Down's further implication that performance gaps appear more frequently and expand faster in bureaus dealing with rapidly changing external environments than those dealing with relatively stable ones. Certainly, today's commercial banks fit this scenario.

Zaltman et al. (1973) suggest that a performance gap is present when the decision-makers perceive a difference between what the organization is doing and what they think it ought to be doing.

Feller, Menzee, and Engel (1974) suggest that there are certain organizational variables that might increase the likelihood that a performance gap will be perceived. They suggest that factors such as diversity of tasks and numbers of occupational or functional specialists are likely to be correlates of organizational innovation. According to Feller et al. these organizational factors are likely to increase the probability that someone in the organization will perceive the performance gap which will lead to organizational innovation.

Rogers (1983) presents a model in which the innovation process consists of a usual sequence of five stages, each characterized by a particular range of events, actions, and decisions made at that point (Figure 3).

Stage in the Innovation Process	Major Activities at Each Stage in the Innovation Process
I. Initiation:	All of the information-gathering, conceptualizing, and planning for the adoption of an innovation, leading up to the decision to adopt.
1. Agenda-Setting	General organizational problems, which may create a perceived need for an innovation, are defined; the environment is searched for innovations of potential value to the organization.
2. Matching	A problem from the organization's agenda is considered together with an innovation, and the fit between them is planned and designed.
----- The Decision to Adopt -----	
II. Implementation:	All of the events, actions, and decisions involved in putting an innovation into use.
3. Redefining/ Restructuring	(1) The innovation is modified and reinvented to fit the situation of the particular organization and its perceived problem, and (2) organizational structures directly relevant to the innovation are altered to accommodate the innovation.
4. Clarifying	The relationship between the innovation and the organization is defined more clearly as the innovation is put into full and regular use.
5. Routinizing	The innovation eventually loses its separate identity and becomes an element in the organization's ongoing activities.

Figure 3. Stages in the Innovation Process in Organizations. -- Source: Rogers (1983), p. 363.

Agenda-setting implies that one or more individuals in an organization identify an important problem and then seek an innovation as one means of coping with the problem. A performance gap is the discrepancy between an organization's expectations and its actual performance. This difference between how an organization's members perceive its performance, in comparison to what they feel it should be, can be a strong impetus to search for an innovation.

In the matching stage of the innovation process, conceptual matching of the problem with the innovation occurs in order to establish how well they are likely to fit.

In the redefining/restructuring stage the innovation imported from outside of the organizational gradually begins to lose its foreign character.

In the clarifying stage the innovation is put into wider use in the organization, and as this happens the meaning of the new idea becomes clearer to the organization's members.

Finally, at the routinizing stage the innovation has become incorporated into the regular activities of the organization, and the innovation loses its separate identity.

Interestingly, vis-a-vis the review of theoretical studies, this researcher was unable to find, in this review of the literature, empirical studies where performance gap

was studied as an organizational variable influencing the adoption of an innovation.

In summary, Downs (1967) provides a basic model of search and change for both individuals and organizations. Zaltman et al. (1973) conceptualizes performance gap as being present when the decision-makers perceive a difference between what the organization is doing and what they think it ought to be doing. Feller et al. (1974) suggest that certain organizational factors are likely to be correlates of organizational innovation and, when present, are likely to increase the probability that someone in the organization will perceive the performance gap. Subsequently, organizational innovation will occur. Finally, Rogers (1983) presents a model in which the innovation process consists of a usual sequence of five stages. Performance gap is found in the first stage of the model which Rogers has identified as "agenda setting." He relates performance gap to innovation by, after conceptualizing it similar to Downs (1967) and Zaltman et al. (1973), indicating that this difference between how an organization's members perceive its performance, in comparison to what they feel it should be, can be a strong impetus to search for an innovation.

Organizational Slack

The ability of effective organizations to innovate has been attributed to the presence of organizational slack (Cyert and March, 1963).

The concept of organizational slack has appeared at various times in the organizational literature as an independent variable used to explain certain kinds of organizational behavior. Slack serves to reduce goal conflict (Cyert and March, 1963), to reduce the information processing needs of a system (Galbraith, 1973), and to promote political behavior within organizations (Astley, 1978).

In Table 3, Bourgeois (1981) presents a quick summary of both the original and the more recent definitions of slack. He argues that the work of James March dominates most of the definitions and offers a condensed paraphrase of his work.

Organizational Slack is that cushion of actual or potential resources which allows an organization to adapt successfully to internal pressures for adjustment or to external pressures for change in policy, as well as to initiate changes in strategy with respect to the external environment (p. 30).

Bourgeois indicates that the above definition has slack playing three roles. In the first, this cushion of what March calls "spare resources" prevents a tightly wound organization from rupturing in the face of a surge of activity.

Table 3. Definitions of Organizational Slack

Source	Definitions
Cyert and March (1963)	<p>"(The) disparity between the resources available to the organization and the payments required to maintain the coalition" (p. 36).</p> <p>E.g.: Excess dividends to stockholders Prices lower than necessary to keep buyers Wages greater than needed to keep labor Perquisites to executives Subunit growth beyond relative rate of contribution</p> <p>"Supply of uncommitted resources" (p. 54). "Resources funneled into the satisfaction of individual and subgroup (vs. organizational) objectives" (p. 98).</p>
Child (1972)	<p>"The margin of surplus (performance exceeding 'satisficing' level) which permits an organization's dominant coalition to adopt structural arrangements which accord with their own preferences (vs. 'goodness of fit' dictates of contingency theory), even at some extra administrative cost" (p. 11).</p>
Cohen, March, and Olsen (1972)	<p>"The difference between the resources of the organization and the combination of demands made on it" (p. 12).</p>
March and Olsen (1976)	<p>"The difference between existing resources and activated demands" (p. 87).</p>
Dimick and Murray (1978)	<p>"Those resources which an organization has acquired which are not committed to a necessary expenditure. In essence, these are resources which can be used in a discretionary manner" (p. 616). Operation = Average profit over 5 years, controlled for size (\$ sales).</p>
Litschert and Bonham (1978)	<p>Using Cyert and March's (1963) definition, they gave the following suggested operation: Slack = the variation from the average among comparable organizations on: ROE, ROTA, Net Sales, and Gross Profit as a percent of Sales.</p>

Table 3.--Continued

Source	Definitions
March (1979)	"Since organizations do not always optimize, they accumulate spare resources and unexploited opportunities which then become a buffer against bad times. Although the buffer is not necessarily intended, slack produces performance smoothing, reducing performance during good times and improving it during bad times" (quoted in Stanford GSB, p. 17).

Source: Bourgeois, L. J., "On the Measurement of Organizational Slack," 1981, Academy of Management, Vol. 6, No. 1, p. 30.

In the second and third roles, slack is an agent of top management in initiating and executing strategic changes. In this case, slack is the resource that enables an organization both to adjust to gross shifts in the external environment with minimal trauma, and to experiment with new postures in relation to that environment, either through new product introductions or through innovations in management style (Mitroff and Emshoff, 1979).

Hambrick and Snow (1977) found that as slack is generated, the organization can literally afford to experiment with new strategies by, for example, introducing new products and entering new markets.

Cyert and March (1963) relied on slack to explain why successful firms introduce innovations. Their general theory of the behavior of the firm predicts that unsuccessful firms will do the innovating (failure induces search for alternatives which leads to new solutions for organizational problems), but they were confronted with empirical data that failed to support the innovation-in-the-face-of-adversity hypothesis (1963, p. 278). As a result they modified their theory to success breeds slack, which mutes the problems of scarcity and provides a source of funds for innovations that would not ordinarily be approved in the face of scarcity.

In summary, in the studies reviewed, organizational slack is found to influence the innovativeness of an organization. In Cyert and March (1963), the ability of effective organizations to innovate is attributed to slack. In Hambrick and Snow (1977), as slack is generated, the organization can afford to experiment with new strategies by introducing new products, entering new markets, etc. In Mitroff and Emshoff (1979), slack is the resource that influences the introduction, by an organization, of new product introductions or innovations in management style. Finally, Bourgeois (1981) suggests that slack plays three roles. The second and third roles view slack as an agent of top management in initiating and executing strategic changes.

Hypotheses

The dependent variable, in this research, is the adoption of a technical innovation, the automated teller machine.

The independent variables, in this research, are listed below. The reasons that they were selected are given, and their operational definitions are presented.

"Size" was selected as an independent variable because I believe, based on the literature reviewed and ten years employment experience in the financial services

industry, that the larger a commercial bank the more likely those individuals in a decision making position are to adopt an innovation.

The organization literature has defined "size" as bigness in staff and budget (Mytinger, 1968), city size (Bingham, 1976), and others (Kaluzny et al., 1973; Mansfield, 1963a). "Size" is defined, in this research, as the total dollar assets of a commercial bank.

Hypothesis 1: Size

H₁: A large commercial bank will be more innovative than a small commercial bank and therefore more likely to adopt an automated teller machine early, i.e., early adopters will have a larger mean than late adopters.

Although there was no support found in a review of the literature, "Complexity" was selected as an independent variable because we believe that the diversity of occupation and number of individuals on the board of directors from outside of a commercial bank influences innovation adoption.

The organization literature has defined "complexity" as diversity of tasks and number of occupational specialties (Feller et al., 1974), level of training required (Hage, 1965), and occupational specialties and degree of professionalism (Rogers, 1983; Zaltman et al., 1973).

"Complexity" is defined, in this research, as diversity of occupation and number of individuals on the board of directors from outside of a commercial bank. Specifically, the integrative-aggregative index (Thompson, 1969) is used to measure innovativeness. The complexity index, in this study, is defined as the total number of individuals on the board of directors from outside of a commercial bank divided by the total number of individuals on the board of directors for each bank organization. The higher the percentage, the greater the degree of integrativeness and thus the higher the innovativeness.

Hypothesis 2: Complexity

H₂: If the ratio of outside appointees on the board of directors to total number of individuals on the board of directors is higher then the bank will be an early innovator, i.e., early adopters as a group will have a larger mean than the group of late adopters.

"Performance Gap" was selected as an independent variable because, contrary to the former independent variables, my review of the literature found this variable to have been studied in the theoretical research but lacking empirical study. Therefore, it is felt that this research can endeavor to make a contribution in that area.

The organizational literature has defined "performance gap" as the discrepancy between an organization's

expectations and its actual performance (Rogers, 1983). It has defined "performance gap" as present when decision-makers perceive a difference between what the organization is doing and what they think it ought to be doing (Zaltman et al., 1973).

"Performance gap" is defined in this study as being present in a banking organization when the decision-makers perceive a difference between what the organization is doing and what they think it ought to be doing. Specifically, performance gap is measured by a decrease in total loans, total deposits, or net profit, for a bank organization, between the two fiscal years prior to adoption. The reason for measuring performance gap this way is that annual report data show the state of a firm's affairs as recorded on a particular day of the year. No reputable financial analyst would make a judgment based on statistics, but would insist on looking at trends (Bourgeois, 1981).

Hypothesis 3: Performance Gap

H_{3a}: When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative and/or absolute decrease in net loans, a bank will innovate by adopting an automated teller machine, i.e., two years prior to adoption it will have a larger mean than one year prior to adoption.

H_{3b}: When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative and/or absolute decrease in total deposits, a bank will innovate by adopting an automated teller machine, i.e., two years prior to adoption it will have a larger mean than one year prior to adoption.

H_{3c}: When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative and/or absolute decrease in net profit, a bank will innovate by adopting an automated teller machine, i.e., two years prior to adoption it will have a larger mean than one year prior to adoption.

"Organizational Slack" was selected as an independent variable because it is of interest to this investigation whether commercial banks, faced with changes brought on by deregulation in the financial services industry and a subsequent increase in competition, are utilizing their slack resources to become more productive by adopting an automated teller machine.

The organizational literature has defined "organizational slack" as payments to members of the coalition in excess of what is required to maintain the organization (Cyert and March, 1963), working capital (Bougeois, 1981; Bourgeois and Singh, 1983), and numerous other ways (see

Table 3). "Organizational Slack" is defined, in this research, as tangible dollar resources that are in the organization and perceived to be available, as a resource, by the decision-makers. Specifically, organizational slack is measured in two ways. The first measure of organizational slack is capital surplus. The second measure of organizational slack is retained earnings.

Hypothesis 4: Organizational Slack

H_{4a}: As slack is generated, measured by capital surplus, a commercial bank will experiment with new strategies, specifically, by introducing new products early, i.e., early adopters of an automated teller machine will have a larger mean than late adopters.

H_{4b}: As slack is generated, measured by retained earnings, a commercial bank will experiment with new strategies, specifically, by introducing new products early, i.e., early adopters of an automated teller machine will have a larger mean than late adopters.

CHAPTER 3

METHOD

Research Method

The following empirical study was intended to further knowledge of the adoption of the automated teller machine. In particular, the study set out to test the hypotheses listed above.

The dependent variable was adoption of the automated teller machine and was measured by banks reporting back to the researcher, via a mail survey, when they had or whether they had not adopted an automated teller machine (ATM).

A national survey of five hundred existing commercial banks, in both branch and unit banking states, provided the data to test the four hypotheses.

Procedures

The American Bank Directory for the Fall and Spring of 1984 was used by the researcher in order to randomly select the 500 banks to be surveyed.

First, the researcher contacted the Bank Marketing Association located at 309 W. Washington St., Chicago, Illinois, 60606, (312) 555-1212, in order to determine which

states were regulated as unit and which were regulated as branch as of December 31, 1983 (see Appendix H).

Secondly, using the American Bank Directory, the researcher manually counted the total number of banks in each state. Then, the total number of banks in each state was divided by the total number of banks in either unit states or branch states, depending on which sample the state was in, in order to arrive at a percentage. The appropriate percentage was then multiplied by the number of banks in the appropriate state in order to determine number of banks selected for this study from each state (see Appendix H for results).

Finally, a random method was used in choosing each bank for the study.

Surveys

The national survey took place in two phases. In the first phase 500 banks from throughout the United States were surveyed beginning in the summer of 1984. A letter was prepared under the guidance of Dr. David Tansik (see Appendix C), introducing the researcher and the purpose of the study underway at the University of Arizona. Included with the letter was a pre-addressed stamped postcard, which provided spaces for an officer of the commercial bank to write in the month and year of adoption, if in fact they

had already adopted an ATM. This postcard served to measure the study's dependent variable, adoption of the automated teller machine (see Appendix D). Approximately two weeks later, a follow-up postcard was mailed to all the banks surveyed that had not responded in order to encourage participation (see Appendix E). In the second phase three hundred and eighteen banks from throughout the United States were surveyed beginning in the fall of 1984 since these were all of the banks responding to the first phase. A letter was prepared under the guidance of Dr. David Tansik (see Appendix F), asking for either original or xerox copies of their annual reports for the years 1973, 1978, and 1983. Approximately two weeks later, a follow-up postcard was mailed to the banks to encourage participation (see Appendix G). The annual reports were to provide data for testing this study's four hypotheses.

Subjects

Three hundred and eighteen banks, of the five hundred surveyed, responded to the first survey letter. Participation was voluntary (see Appendix A).

A second survey letter was sent to the respondents of the first letter asking for copies of their annual reports for the year(s) 1973, 1978, and 1983. The researcher's purpose for requesting these years was to obtain

trend data for these years, as well as prior years, in order to test the study's hypotheses (preliminary review of several annual reports from several different commercial banks indicated that data was reported over a five year period for comparative purposes). Ninety-three banks, of the 318 banks surveyed, responded to the second survey letter (see Appendix B).

Data Analysis

The data analysis is based on annual report data from those banks listed in Appendix B.

The diffusion period, in this study, is from 1970 to 1984. An early/late adoption classification (Rogers, 1983), has been used to categorize early adopters as those commercial banks adopting from 1970 to 1978 and late adopters as those commercial banks adopting from 1979 to 1984 (Zimmer, 1984). For the purpose of this study innovation is defined by the adoption date.

The interpretation of the data is based on t-tests. The confidence level determining the acceptance of the hypotheses was 95%, or $\alpha = 0.05$. In particular the t-statistic was used to test whether the hypotheses concerning early/late adopters are correct, whether there are any significant differences between the two groups as far as the size, complexity, and organizational slack variables

are concerned, whether the hypothesis concerning a decrease in productivity is correct, and whether there is any significant difference between the two years prior to adoption as far as the performance gap variable is concerned using a paired T-test.

CHAPTER 4

RESEARCH RESULTS

The results of this study are presented in this chapter. Statistical analyses of the adopters' data for each hypothesis is provided.

Statistical Tests of Hypotheses and Results

The hypotheses were tested with t-tests. The t-statistic was applied to determine if the assumed relationships are supported by an indepth analysis of the data.

Inflation has not been taken into account due to the difficulty in determining its effect and it is assumed that the inflation effect would be consistent across the sample.

The number of cases in the following tables vary since the researcher did not include cases with missing data for the variable under analysis.

First Hypothesis H_1

The first hypothesis stated that a large commercial bank will be more innovative than a small commercial bank and therefore more likely to adopt an automated teller machine early, i.e., early adopters will be of

larger mean size than late adopters. The statistical analysis did not support this hypothesis. The means and standard deviations are shown in Table 4. The mean score for the Early adopter group is higher than the mean of the Late adopter group. However, the scores for the Late adopter group are more homogeneous, as shown by the lower standard deviation for this group. The t-statistic was 0.89, with a significance at the 0.398 level. Thus, H_1 has to be rejected.

Second Hypothesis H_2

The second hypothesis stated that if the ratio of outside appointees on the board of directors to total number of individuals on the board of directors is higher then the bank will be an early innovator, i.e., early adopters as a group will be of larger mean complexity than the group of late adopters. The complexity index is defined as the total number of individuals on the board of

Table 4. Size (in total dollar assets)

	Cases	\bar{X}	S.D.	t	P
Early Adopters	8	1,969,327.00	3,385,961.56	0.89	0.398
Late Adopters	25	875,345.40	1,295,625.23		

directors from outside of a commercial bank divided by the total number of individuals on the board of directors for each bank organization. The statistical analysis did not support this hypothesis. The complexity index means and standard deviations are shown in Table 5. The mean complexity score for the early adopter group is higher than the mean of the late adopter group. The complexity scores for the early adopter group are more homogeneous, as shown by the lower standard deviation for this group. The t-statistic was 1.38, with a significance at the 0.182 level. Thus, H_2 has to be rejected.

Third Hypothesis H_3

The third hypothesis stated:

H_{3a} : When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative and/or absolute decrease in net loans, a bank will innovate by adopting an automated teller machine,

Table 5. Complexity (outsiders/total board members)

	Cases	\bar{X}	S.D.	t	P
Early Adopters	6	83.83	6.18	1.38	0.182
Late Adopters	16	78.25	9.07		

i.e., two years prior to adoption, a bank will have a larger mean of total loans than one year prior to adoption.

H_{3b} : When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative and/or absolute decrease in total deposits, a bank will innovate by adopting an automated teller machine, i.e., two years prior to adoption, a bank will have a larger mean of total deposits than one year prior to adoption.

H_{3c} : When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative and/or absolute decrease in net profit, a bank will innovate by adopting an automated teller machine, i.e., two years prior to adoption, a bank will have a larger mean of net profit than one year prior to adoption.

The statistical analysis did not support H_{3a} . The means and standard deviations are shown in Table 6. The

Table 6. Loans

	Cases	\bar{X}	S.D.	t	P
1 Year Prior to Adoption	12	1,163,986.33	2,846,513.72	1.49	0.164
2 Years Prior to Adoption	12	1,099,413.00	2,840,167.95		

mean score for the one year prior to adoption group is higher than the mean for the two years prior to adoption group.

The scores for the two years prior to adoption group are more homogeneous, as shown by the lower standard deviation for this group. The t-statistic was 1.49, with a significance at the 0.164 level. Thus, H_{3a} has to be rejected.

The statistical analysis also did not support H_{3b} . The means and standard deviations are shown in Table 7. The mean score for the one year prior to adoption group is higher than the mean for the two years prior to adoption group. The scores for the two years prior to adoption group are more homogeneous, as shown by the lower standard deviation for this group. The t-statistic was 2.15, with a significance at the 0.052 level. Thus, H_{3b} has to be rejected.

Table 7. Deposits

	Cases	\bar{X}	S.D.	t	P
1 Year Prior to Adoption	13	1,246,719.69	2,740,310.14	2.15	0.052
2 Years Prior to Adoption	13	1,149,710.46	2,730,270.22		

The statistical analysis did not support H_{3c} . The means and standard deviations are shown in Table 8. The mean score for the one year prior to adoption group is lower than the mean for the two years prior to adoption group. The scores for the one year prior to adoption group are more homogeneous, as shown by the lower standard deviation group for this group. The t-statistic was -0.41, with a significance at the 0.691 level. Thus, H_{3c} has to be rejected.

Fourth Hypothesis H_4

The fourth hypothesis stated:

H_{4a} : As slack is generated, measured by capital surplus, a commercial bank will experiment with new strategies, specifically, by introducing new products early, i.e., early adopters of an automated teller machine will have greater mean capital surplus than late adopters.

Table 8. Net Profit

	Cases	\bar{X}	S.D.	t	P
1 Year Prior to Adoption	12	5,305.42	5,613.63	-0.41	0.691
2 Years Prior to Adoption	12	5,473.50	5,950.99		

H_{4b} : As slack is generated, measured by retained earnings, a commercial bank will experiment with new strategies, specifically, by introducing new products early, i.e., early adopters of an automated teller machine will have greater mean retained earnings than late adopters.

The statistical analysis did not support this hypothesis for H_{4a} . The means and standard deviations are shown in Table 9. The mean score for the early adopter group is higher than the mean of the later adopter group. However, the scores for the late adopter group are more homogeneous, as shown by the lower standard deviation for this group. The t-statistic was 1.56, with a significance at the 0.152 level. Thus, H_{4a} has to be rejected.

The statistical analysis did not support H_{4b} . The means and standard deviations are shown in Table 10. The mean score for the early adopter group is higher than the mean of the late adopter group. However, the scores for the late adopter group are more homogeneous, as shown by the lower standard deviation for this group. The t-statistic was 0.99, with a significance at the 0.333 level. Thus, H_{4b} has to be rejected.

The combined results of the statistical analyses of the data are summarized in Table 11.

Table 9. Capital Surplus

	Cases	\bar{X}	S.D.	t	P
Early Adopters	8	30,711.25	32,882.39	1.56	0.152
Late Adopters	20	11,408.30	18,483.05		

Table 10. Retained Earnings

	Cases	\bar{X}	S.D.	t	P
Early Adopters	7	27,740.71	34,977.51	0.99	0.333
Late Adopters	21	15,597.67	25,793.15		

Table 11. Results of the Statistical Analyses, and the Pattern of Results

Independent Variables	Performance Gap													
	Size		Complexity		Loans		Deposits		Net Profit		Organizational Slack			
	One Year Prior to Adopt	Two Years Prior to Adopt	One Year Prior to Adopt	Two Years Prior to Adopt	One Year Prior to Adopt	Two Years Prior to Adopt	One Year Prior to Adopt	Two Years Prior to Adopt	Capital Surplus	Retained Earnings	Early	Late	Early	Late
Groups	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late	Early	Late
\bar{X}	1,949,327.00	875,345.40	83.83	78.25	1,163,946.33	1,099,413.00	1,246,719.69	1,149,710.41	5,305.42	5,473.50	10,711.25	11,408.30	27,740.71	15,597.69
S.D.	2,295,962.56	2,295,625.23	6.18	9.07	2,846,513.72	2,860,167.95	2,740,310.14	2,730,270.21	5,613.63	5,950.99	32,802.39	18,463.05	34,977.51	21,277.14
t-Statistic	0.89		1.38		1.49		2.15		-0.41		1.58		1.59	
Level of Significance	0.390		0.182		0.144		0.052		0.691		0.112		0.113	
Hypothesis	Significantly higher for early group		Significantly higher for early group		Significantly higher for two years prior group		Significantly higher for two years prior group		Significantly higher for two years prior group		Significantly higher for early group		Significantly higher for early group	
Hypothesis Supported	No		No		No		No		No		No		No	
Results in Hypothesized Direction	Yes		Yes		No		No		Yes		Yes		Yes	

Supplementary Analysis

The researcher suspects that there are differences in a bank's regulatory environment that impacted the results of this study. This issue raised an interest in the distribution of banks in this study.

Hannan and McDowell (1984) found that a bank's regulatory environment shapes its adoption decision.

Their data allowed them to examine the impact of regulatory restrictions on this aspect of innovative activity, since states differ in terms of the restrictions imposed on banks and their usage of ATMs.

State regulatory restrictions on the usage of ATMs themselves differ in at least one important respect according to Hannan and McDowell (1984). While some states allow banks to locate ATMs away from the premises of an established banking office, others do not. This distinction, they argue, should prove important in states which prohibit or restrict branching activity, since off premise ATMs may enable banks partially to circumvent these restrictions. They found that banks are more likely to adopt ATMs as a means of attracting customers when the alternative of providing convenience through branching is restricted.

Since the researcher suspects that there are differences in a bank's regulatory environment that

impacted the results of this study, a supplemental analysis to this thesis was conducted. Each of the hypotheses of this study were tested with t-tests in each subset, i.e., branch states as one subset and unit states as another. The t-statistic was used to determine if the assumed relationships are supported by an indepth analysis of the data. The number of cases in the following tables will again vary since the researcher did not include cases with missing data for the variable under analysis. The analysis was exploratory and the findings follow.

H₅: A large commercial bank in a branch or unit state will be more innovative than a small commercial bank in a branch or unit state and therefore more likely to adopt an automated teller machine early, i.e., early adopters will have a larger mean than late adopters.

As shown in Table 12, the mean score for the branch early adopter group is higher than the mean of the branch late adopter group and the unit late adopter group. The unit early adopter group could not be compared since there was missing data for this group. The sources of the unit late adopter group are more homogeneous as shown by the lower standard deviation for this group. The t statistic for the branch adopters was 0.76, with a p value at the 0.467 level. Thus, H₅ has to be rejected.

Table 12. Size (in total dollar assets)

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	8	1,969,327.00	3,385,961.56		
Late Adopters	21	1,028,413.86	1,363,913.45	0.76	0.467
<u>Unit</u>					
Early Adopters	0	-	-		
Late Adopters	4	71,736.00	48,628.23		

H_6 : If the ratio of outside appointees on the board of directors to total number of individuals on the board of directors of a branch or unit state is higher, then the bank will be an early innovator, i.e., early adopters will be of larger mean complexity than the late adopters.

As down in Table 13, the mean complexity score for the branch early adopter group is higher than the mean of the branch late adopter group and the unit late adopter group. The unit early adopter group could not be compared since there was missing data for this group. The complexity scores of the unit late adopter group are more homogeneous as shown by the lower standard deviation for this group. The t statistic for the branch adopters was 1.41, with a p value at the 0.177 level. Thus, H_6 has to be rejected.

Performance gap, in this supplementary analysis, is measured in H_{7a} by subtracting loans two years prior to adoption from loans one year prior to adoption and dividing by loans two years prior to adoption. H_{7b} is measured by subtracting deposits two years prior to adoption from deposits one year prior to adoption and dividing by deposits two years prior to adoption. Finally, H_{7c} is measured by subtracting net profit two years prior to adoption from net profit one year prior to adoption and dividing by net profit two years prior to adoption.

Table 13. Complexity (outsiders/total board members)

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	6	83.83	6.18	1.41	0.177
Late Adopters	14	77.79	9.63		
<u>Unit</u>					
Early Adopters	0	-	-		
Late Adopters	2	81.50	2.12		

Unit early and late adopters are not compared to branch early and late adopters for the performance gap variable, since there was missing data for the unit early and late adopter cases.

H_{7a} : When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative decrease in net loans, a bank in a branch or unit state will innovate by adopting an automated teller machine.

As shown in Table 14, the mean score for the branch late adopter group is higher than the mean of the branch early adopter group. The scores of the branch early adopter group are more homogeneous as shown by the lower standard deviation for this group. The t statistic for the branch adopters was -0.69, with a p value at the 0.51 level. Thus, H_{7a} has to be rejected.

Table 14. R Loans

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	2	.06	.09	-0.69	0.51
Late Adopters	10	.13	.13		

H_{7b} : When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative decrease in total deposits, a bank in a branch or unit state will innovate by adopting an automated teller machine.

As shown in Table 15, the mean score for the branch late adopter group is higher than the mean of the branch early adopter group. The scores of the branch early adopter group are more homogeneous as shown by the lower standard deviation for this group. The t statistic for the branch adopters was -0.75, with a p value at the 0.47 level. Thus, H_{7b} has to be rejected.

H_{7c} : When a commercial bank is faced with a performance gap via a decrease in productivity, measured by a relative decrease in net profit, a bank in a branch or

Table 15. R Deposits

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	3	.13	.12	-0.75	0.47
Late Adopters	10	.24	.22		

unit state will innovate by adopting an automated teller machine.

As shown in Table 16, the mean score for the branch late adopter group is higher than the mean of the branch early adopter group. The scores of the branch early adopter group are more homogeneous as shown by the lower standard deviation for this group. The t statistic for the branch adopters was -0.98, with a p value at the 0.35 level. Thus, H_{7c} had to be rejected.

H_{8a} : As slack is generated, measured by capital surplus, a commercial bank in a branch or unit state will experiment with new strategies, specifically, by introducing new products early, i.e., early adopters of an automated teller machine will have greater mean capital surplus than late adopters.

Table 16. R Profit

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	3	-.06	.20	-0.98	0.35
Late Adopters	9	.18	.41		

As shown in Table 17, the mean score for the branch early adopter group is higher than the mean of the branch late adopter group and the unit late adopter group. The unit early adopter group could not be compared since there was missing data for this group. The t statistic for the branch adopters was 1.60, with a p value at the 0.124 level. Thus, H_{8a} has to be rejected.

H_{8b} : As slack is generated, measured by retained earnings, a commercial bank in a branch or unit state will experiment with new strategies, specifically, by introducing new products early, i.e., early adopters of an automated teller machine will have greater mean retained earnings than late adopters.

As shown in Table 18, the mean score for the branch early adopter group is higher than the mean of the branch late adopter group and the unit late adopter group. The unit early adopter group could not be compared since there was missing data for this group. The scores for the unit late adopter group are more homogeneous as shown by the lower standard deviation for this group. The t statistic for the branch adopters was 0.67, with a p value at the 0.51 level. Thus, H_{8b} has to be rejected.

Table 17. Capital Surplus

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	8	30,711.25	32,882.39	1.60	0.124
Late Adopters	16	13,454.13	20,193.13		
<u>Unit</u>					
Early Adopters	0	-	-		
Late Adopters	4	3,225.00	3,631.92		

Table 18. Retained Earnings

	Cases	\bar{X}	S.D.	t	P
<u>Branch</u>					
Early Adopters	7	27,740.71	34,977.51	0.67	0.51
Late Adopters	17	18,742.76	27,859.94		
<u>Unit</u>					
Early Adopters	0	-	-		
Late Adopters	4	2,231.00	1,165.17		

CHAPTER 5

SUMMARY AND CONCLUSIONS

In this chapter, the results of the thesis are summarized and some conclusions are presented. Suggestions for further research also are outlined.

Summary of Results

The results of this research do not clearly determine whether the independent variable(s) "size," "complexity," "performance gap," and "organizational slack" have a significant and positive impact on the adoption of a technical innovation, the automated teller machine. Based on t-tests alone, the above mentioned relationship(s) must be rejected. The early adopters' group means as compared to the late adopters' group means for the variables "size," "complexity," and "organizational slack," are in the hypothesized direction in support of the researcher's hypotheses. This finding is particularly noteworthy since all three variables comparing early/late adopter groups had a larger group mean for the early adopting group than for the late adopting group. The t-testing for a significant difference between the early adopting group and the late adopting group, however, did not result in any significant

difference between the two groups. With regard to the "performance gap" variable, the net profit measure is in the hypothesized direction but the loans and deposits measures are not. Thus, this finding would have been more convincing had loans and deposits also been in the hypothesized direction. The t-test for a significant difference between the one year prior to adoption group and the two years period to adoption group, however, did not result in any significant difference between the two groups. The researcher attributes the equivocal results to two factors:

1. Deregulation of the financial services industry.
2. Productivity.

Deregulation of the Financial Services Industry

Morrissey and McCormick (1986) state that the banking industry is undergoing dramatic changes as deregulation and technology have created new competition, new products, new geographic markets, and more sophisticated consumer demands. He writes that lawmakers throughout the country are considering legislation that will reshape the banking industry. He further indicates that most banking industry leaders believe that geographic regulations will have all but

vanished by 1990. This is evidenced by the fact that 25 states have passed some form of regional interstate banking legislation. Finally, they indicate that banks are developing strategies to survive in this new environment and are faced with the question of whether to remain independent or merge.

Sanford (1986) writes that the uneven and inconsistent progress of deregulation has created a challenge to the economic survival of money center commercial banks in the financial services industry. He indicates that competitors are not as impeded by regulations and are therefore more cost effective and competitive than commercial banks. Competitors include investment banks, insurance companies, and massive conglomerates. Also, he writes that commercial banks have a situation in which the liability side of the balance sheet has been deregulated, and the asset side has not. Sanford, who is president of Bankers Trust, writes that his bank was feeling the pressures of uneven deregulation in the late 1970s. Therefore, they focused their resources on innovative services to corporations, governments, financial institutions, and certain individuals. They decided to create the sort of corporation that was sensitive to change, one that listened carefully to its line managers and then responded in a timely fashion.

In Chapter 1 of this thesis, the researcher suggests that the commercial banking organizations that are to survive today and in the future, either through merger or independently, adapting to change, will need to recognize the importance of being innovative and adopt technology that will increase their productivity. Morrissey and McCormick (1986) and Sanford (1986) add further support of the researchers suggestion in Chapter 1 of this thesis.

The researcher suspects that the early adopters, in this study, were already endeavoring to survive either through merger or independently adapting to change. Thus, the results in the hypothesized direction for H_1 , H_2 , H_{4a} , and H_{4b} when comparing the early adopter group, i.e., mean size (1970-1978) to the late adopter group (1979-1984). Hannan and McDowell (1984) in their sample of 3,841 banks found larger banks to exhibit a higher conditional probability of ATM adoption. They argue this finding to be consistent with several different explanations, including economies of scale in the use of ATMs, less relative risk exposure on the part of larger banks, and different attitudes toward new technology on the part of managers of larger banks.

Productivity

Zimmer (1986) indicates that the ATM industry is now in a state of flux, with no set direction in which to turn. Survival, capital preservation, top-level strategic planning and positioning, mergers and competition are all commanding priority attention today. The past year (1985), with its emphasis on capital preservation, survival and positioning, brought with it a strong top management interest in cost effectiveness and profitability potential of ATMs.

In Chapter 1 of this thesis, the researcher refers to productivity being a word of many different meanings. It is often treated as a mechanical issue of input and output, reflected in accounting costs of the products turned out. This sort of productivity is the result of the confusion of efficiency with effectiveness. As Peter Drucker has pointed out, efficiency is doing things right; effectiveness is doing the right things (Kanter, 1983). The researcher further points out that the aspect of productivity that needs serious attention is not the mechanical output of a production facility; it is rather, the capacity of the organization to satisfy customer needs most fully with whatever resources it has at its disposal. This may require modification of the product, development

of entirely new products, or changes in the ways they are delivered to customers. Chase, Northcraft, and Wolf (1984) argue that "effectiveness issues revolve around how to make a product more attractive or need-fulfilling for the customer while efficiency concerns focus on how to produce and deliver a service at the lowest cost to the service system. The relative weighting of efficiency and effectiveness in high-contact service system design may depend on market conditions. For example, if the set of services that can be offered is limited by regulation (as has been the case traditionally with banks), service systems compete on cost (efficiency). When deregulation occurs, competition moves to services offered (effectiveness). The efficiency/effectiveness trade-off may also be affected by available service-delivery technology" (p. 545).

The researcher suspects that with respect to performance gap, productivity (effectiveness) increases for loans and deposits measures may be due to deregulation occurring and subsequent movement by banks to services offered (effectiveness). Thus, for H_{3a} and H_{3b} the results are not in the hypothesized direction. The profit measure, on the other hand is a result of services offered. Thus, for H_{3c} the results are in the hypothesized direction.

Summary of Supplemental/Analysis Results

The results of this supplemental analysis do not clearly determine whether the independent variables "size," "complexity," "performance gap," and "organizational slack" have a significant and positive impact on the adoption of a technical innovation, the automated teller machine. Based on t-tests alone, the above mentioned relationship(s) must be rejected. The branch early adopters group mean for the variables "size," "complexity," and "organizational slack," are in the hypothesized direction confirming the researcher's hypotheses. This finding is similar to the major finding of this research where "size," "complexity," and "organizational slack," comparing early/late adopter groups, had a larger group mean for the early adopting group than for the late adopting group. Further, the t-testing here for a significant difference between the branch or unit state early/late adopter groups is similar to the earlier finding where the t-testing for a significant difference between the early adopting group and late adopter group did not result in any significant difference between the two groups. With regards to the "performance gap" variable in the supplemental analysis, the loans, deposits, and net profit variables are in the hypothesized direction. The branch late adopters group mean is higher than the branch early adopters group mean. However, this

indicates that the branch late adopters have less of a decrease in loans, deposits, and net profit relative to branch early adopters. The t-testing for a significant difference between the branch early adopters and branch late adopters did not result in a significant difference. The researcher attributes the equivocal results to two factors:

1. Deregulation of the financial services industry.
2. Productivity.

Deregulation of the Financial Services Industry

Morrissey and McCormick (1986) indicate that the banking industry is undergoing dramatic changes as deregulation and technology have created new competition, new products, new geographic markets, and more sophisticated consumer demands. Further, they write that banks are developing strategies to survive in this new environment and are faced with the question of whether to remain independent or merge.

Sanford (1986) suggests that the uneven and inconsistent progress of deregulation has created a challenge to the economic survival of money center commercial banks in the financial services industry. Bankers Trust was feeling the pressures of deregulation in the late 1970's and focused their resources on innovative services. They

created a corporation sensitive to change, one that listened carefully to its line managers and then responded in a timely fashion.

This researcher suspects that the branch early adopters were already endeavoring to survive either through merger or independently adapting to change. Thus, the results in the hypothesized direction for H_5 , H_6 , H_{8a} and H_{8b} . Further, it could be argued that these banks were able to provide convenience via location and ATM's, since branching for these banks was not restricted (Hannan and McDowell, 1984).

The researcher suspects that branch late adopters had the benefit of learning from the branch early adopters efforts to survive. Thus, the results in the hypothesized direction for H_{7a} , H_{7b} , and H_{7c} .

Productivity

Zimmer (1986) indicates survival, capital preservation, top-level strategic planning and positioning, mergers and competition are all commanding priority attention today. The researcher has pointed out earlier that the aspect of productivity that needs serious attention is not the mechanical output of a production facility; it is rather, the capacity of the organization to satisfy customer needs most fully with whatever resources it has at

its disposal. Chase, Northcraft, and Wolf (1984) argue that effectiveness issues revolve around how to make a product more attractive or need-fulfilling for the customer while efficiency concerns focus on how to produce and deliver a service at the lowest cost to the service system.

This researcher suspects that productivity (effectiveness) increases for loans, deposits, and net profit may be due to deregulation occurring and subsequent movement by branch late adopters to services offered (effectiveness). Thus, H_{7a} , H_{7b} , and H_{7c} , as measured in the supplemental analysis, are in the hypothesized direction.

The researcher suspects the sample size for this study and the supplemental analysis was too low. Nevertheless, the results were in the hypothesized direction for H_1 , H_2 , H_{3c} , H_{4a} , and H_{4b} . In the supplemental analysis the results were in the hypothesized direction for H_5 , H_6 , H_{7a} , H_{7b} , H_{7c} , H_{8a} , and H_{8b} .

Contributions Made by the Research

To the researcher's knowledge, this is the first study conducted that investigates the relationship between size, complexity, performance gap, organizational slack, and the adoption of the technical innovation, an automated teller machine. This fact alone constitutes the contributory character of this research. The researcher, however,

is aware of the fact that the contributory nature of research is not determined by academic interest alone. The researcher believes that this research has practical importance to people involved in the field. In the case of this study, the practical implications would extend to managers of automated teller machine departments and other organizational decision-makers involved in the decision(s) of whether to adopt ATM's for their organizations. Whether this research offers any decision-making assistance to the manager or other organizational decision-makers thinking about adoption, the researcher answers "yes." It is a cautious "yes" because of the equivocal results yielded by this study and the supplementary analysis. In the supplementary analysis, the branch early adopters group mean for the variables size, complexity, and organizational slack were in the hypothesized direction. This implies that branch early adopters, of an ATM, tend to be the larger banks, where the ratio of appointees on the board of directors to total number of individuals on the board of directors is higher, and slack tends to be greater. The branch late adopters group mean for the variable performance gap was in the hypothesized direction. This implies that branch early adopters had a large decrease in loans, deposits, and net profit relative to branch late adopters. There is practical importance here

to managers of automated teller machine departments and other organizational decision-makers involved in the expensive decisions of whether to adopt ATMs for their organizations. The practical importance is that the variables size, complexity, performance gap, and organizational slack should have consideration in their ATM adoption decision(s). The researcher suspects that a manager or other organizational decision-maker who is "effectiveness" minded (Kanter, 1983; Chase et al., 1984) would be more prepared to accept this study as a decision-making aid.

Suggestions for Further Research

An area of interest may be to expand the scope of this research from commercial banks to include Savings and Loan Associations. Thus, we will be in a position to begin to make comparative observations concerning factors surrounding the adoption of ATM's.

The researcher is of Hispanic-American heritage and suggests another personal area of interest may be to investigate the diffusion and adoption of innovations in minority-owned commercial banks. French (1983) has written that the increase in the number of minority banks has raised serious questions with regard to their economic efficiency as financial institutions and to their proper role in the context of today's economy. He defines a

minority bank to be minority if 50 percent of its stock is owned by Blacks, Hispanic-Americans, American Indians, Asian-Americans, Eskimos, Aleuts, and women.

Finally, the supplementary analysis supported the study's data being in the hypothesized direction. An area for further research would be to utilize a more extensive data set in each subset of the supplementary analysis.

Conclusion

The diffusion and adoption of a technical innovation, the automated teller machine, is a worthwhile area of study. The reasons why a commercial bank decides to adopt the ATM are many and include: 1) deregulation of the financial services industry, 2) productivity issues, and 3) circumvention of restrictive branch state laws.

APPENDIX A



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

<u>Name of Bank</u>	<u>State</u>	<u>Month/Year ATM Adopted</u>
1. The First National Bank	Mitchell, Indiana	March, '80
2. Salem Bank	Goshen, Indiana	November, '72
3. Dubois County Bank	Jasper, Indiana	June, '84
4. The Danville State Bank	Denville, Indiana	October, '79
5. Bank of Indiana, N.A.	Gary, Indiana	September, '80
6. The First National Bank of Knightstown	Knightstown, Indiana	none
7. The State Exchange Bank	Culver, Indiana	June, '81
8. Security Bank and Trust Company	Vincennes, Indiana	December, '76
9. First National Bank in Elberton	Elberton, Georgia	June, '82
10. First Virginia Banks, Inc.	Falls Church, Virginia	July, '72
11. The Bank of Dalton	Dalton, Georgia	July, '80
12. First Interstate Bank of Washington, N.A.	Seattle, Washington	November, '73
13. American Marine Bank	Winslow, Washington	none
14. Chittenden Trust Company	Burlington, Vermont	November, '80
15. The First National Montana Bank of Missoula	Missoula, Montana	August, '76
16. Old National Bank of Washington	Spokane, Washington	January, '75
17. Bank of Park Forest	Park Forest, Illinois	none
18. Main Bank of Chicago	Chicago, Illinois	January, '80
19. Community Trust Bank	Irvington, Illinois	March, '81
20. Community Bank of Mahomet	Mahomet, Illinois	December, '80
21. Corn Belt Bank	Bloomington, Illinois	April, '82
22. Interfirst Bank D/FW Freeport, N.A.	Dallas, Texas	May, '83
23. Tompkins State Bank	Avon, Illinois	none
24. River Oaks Bank and Trust Company	Houston, Texas	November, '78
25. Powell State Bank	Powell, Texas	none
26. Soy Capital Bank and Trust Company	Decatur, Illinois	July, '82
27. German-American State Bank	German Valley, Illinois	none
28. Texas Commerce Bank	Beaumont, Texas	none
29. First Comanche Bank	Comanche, Texas	none
30. First Bank	Edna, Texas	none
31. The Bank of Cripple Creek	Cripple Creek, Colorado	none
32. The First National Bank of Fort Morgan	Fort Morgan, Colorado	September, '61



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

33.	Omnibank Louisville	Louisville, Colorado	January, '81
34.	Pitkin County Bank and Trust Company	Aspen, Colorado	none
35.	State Bank of Kingman	Kingman, Kansas	none
36.	Brotherhood Bank and Trust Company	Kansas City, Kansas	September, '82
37.	The State Bank of Canton	Canton, Kansas	none
38.	The National Bank of Caruthersville	Caruthersville, Missouri	none
39.	Commerce Bank of Poplar Bluff	Poplar Bluff, Missouri	none
40.	Merchantile of Macon	Macon, Missouri	none
41.	First National Charter Bank	Kansas City, Missouri	October, '76
42.	First National Bank and Trust Company of Columbus	Columbus, Nebraska	February, '81
43.	First National Bank in Ord	Ord, Nebraska	December, '81
44.	The Hershey State Bank	Hershey, Nebraska	July, '82
45.	First National Bank	Lewellen, Nebraska	none
46.	Citizens National Bank and Trust of Muskogee	Muskogee, Oklahoma	August, '79
47.	Ringling State Bank	Ringling, Oklahoma	none
48.	American National Bank of Rock Springs	Rock Springs, Wyoming	July, '84
49.	Trans World Bank	Sherman Oaks, California	September, '83
50.	Mid-State Bank	Arroyo Grande, California	November, '82
51.	Trans National Bank	Monterey Park, California	October, '83
52.	La Jolla Bank and Trust Company	La Jolla, California	February, '80
53.	Savings Bank of Mendocino County	Ukiah, California	none
54.	The First National Bank	Nowata, Oklahoma	November, '80
55.	Mechanics National Bank	Paramount, California	February, '79
56.	First State Bank	Brunsville, Iowa	none
57.	Buffalo Savings Bank	Buffalo, Iowa	none
58.	Tri-County State Bank	Zearing, Iowa	none
59.	Brenton State Bank	Dallas Center, Iowa	November, '83
60.	Templeton Savings Bank	Templeton, Iowa	none
61.	Norwalk-Comming State Bank	Norwalk, Iowa	none
62.	The State Bank	Spirit Lake, Iowa	none
63.	Security Savings Bank	Farnhamville, Iowa	none
64.	Rock Rapids State Bank	Rock Rapids, Iowa	none
65.	Ackley State Bank	Ackley, Iowa	December, '82
66.	New Vienna Savings Bank	New Vienna, Iowa	none
67.	Peoples State Bank	Elkader, Iowa	none
68.	Deseret Bank	Pleasant Grove, Utah	none
69.	First Security Bank of Utah, N.A.	Salt Lake City, Utah	May, '79



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

70.	Puget Sound National Bank	Tacoma, Washington	July, '75
71.	Norwest National Bank	Vancouver, Washington	August, '82
72.	Howard Bank, N.A.	Burlington, Vermont	July, '79
73.	Northwestern Commercial Bank	Bellingham, Washington	none
74.	The Third National Bank	Circleville, Ohio	November, '82
75.	The First National Bank of Barnsville	Barnsville, Ohio	none
76.	United Jersey Bank-Mid State	Hazlet, New Jersey	March, '83
77.	First Peoples Bank of New Jersey	Westmont, New Jersey	June, '81
78.	First Jersey National Bank	Jersey City, New Jersey	January, '82
79.	Farmers and Merchants Bank and Trust	Marinette, Wisconsin	August, '77
80.	Jefferson County Bank	Jefferson, Wisconsin	none
81.	DeForest-Morrisonville	DeForest, Wisconsin	September, '79
82.	Citizens State Bank	Clinton, Wisconsin	none
83.	City Bank and Trust Company	Portage, Wisconsin	September, '82
84.	The Reedsburg Bank	Reedsburg, Wisconsin	January, '84
85.	The Security State Bank	Amherst Junction, Wisconsin	none
86.	Boscobel State Bank	Boscobel, Wisconsin	none
87.	Union Bank and Trust Company	Evansville, Wisconsin	none
88.	Shell Lake State Bank	Shell Lake, Wisconsin	none
89.	Calumet County Bank	Brillion, Wisconsin	none
90.	Bank of Marlinton	Marlinton, W. Virginia	none
91.	The Bank of Man	Man, W. Virginia	none
92.	Peoples Bank of Bluewell	Bluewell, W. Virginia	August, '83
93.	Community Bank and Trust N.A.	Fairmont, W. Virginia	January, '84
94.	Key Bank of Central New York	Syracuse, New York	August, '84
95.	The Herkimer County Trust Company	Little Falls, New York	March, '82
96.	Apple Bank For Savings	New York, New York	January, '74
97.	Raccoon Valley State Bank	Adel, Iowa	November, '77
98.	Manufacturers Bank and Trust Company	Forest City, Iowa	none
99.	Bank of America	San Francisco, California	August, '79
100.	Imperial Bank	Los Angeles, California	none
101.	Security Pacific National Bank	Los Angeles, California	September, '79
102.	Farmers and Merchants Bank of Central California	Lodi, California	none



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

103.	The First National Bank of Guymon	Guymon, Oklahoma	none
104.	The First National Bank of Seminole	Seminole, Oklahoma	March, '79
105.	Springfield State Bank	Springfield, Nebraska	none
106.	Commerce Bank of Wentzville	Wentzville, Missouri	June, '83
107.	Eastside Bank and Trust	Wichita, Kansas	January, '80
108.	The National Bank of America	Salina, Kansas	August, '79
109.	First Bank of Newton	Newton, Kansas	August, '84
110.	First City Bank of Northline	Houston, Texas	October, '78
111.	American Bank	Houston, Texas	none
112.	Western Bank-Westheimer	Houston, Texas	July, '81
113.	Kyle State Bank	Kyle, Texas	July, '83
114.	Texas American Bank	Farmers Branch, Texas	none
115.	Tri-State Bank of East Dubuque	East Dubuque, Illinois	July, '84
116.	First National Bank of Moline	Moline, Illinois	April, '82
117.	Bank of Farmington	Farmington, Illinois	April, '81
118.	American Bank of Rock Island	Rock Island, Illinois	May, '80
119.	Citizens Bank and Trust Company of Maryland	Landover, Maryland	April, '82
120.	Provident Bank of Maryland	Baltimore, Maryland	June, '83
121.	Coastal Savings Bank	Portland, Maine	none
122.	Clackamas County Bank	Sandy, Oregon	January, '82
123.	County Bank and Trust Company	Morehead City, North Carolina	none
124.	First Union National Bank	Charlotte, North Carolina	June, '79
125.	First-Citizens Bank and Trust Company	Raleigh, North Carolina	October, '80
126.	Bank of Salem	Salem, Arkansas	none
127.	Commercial National Bank of Texarkana	Texarkana, Arkansas	September, '81
128.	Merchants and Planters Bank	Manila, Arkansas	none
129.	First National Bank of Camden	Camden, Arkansas	February, '76
130.	The Bank of Maplesville	Maplesville, Alabama	none
131.	Nevada Bank and Trust Company	Caliente, Nevada	none
132.	Maine Savings Bank	Portland, Maine	August, '82
133.	Bank of Prattville	Prattville, Alabama	August, '83
134.	Coffee County Bank	Enterprise, Alabama	none
135.	The Monroe County Bank	Monroeville, Alabama	February, '83
136.	First Alabama Bank of Dothan	Dothan, Alabama	October, '71
137.	Pacific Western Bank	Milwaukie, Oregon	July, '80
138.	First Interstate Bank of Oregon, N.A.	Portland, Oregon	January, '72
139.	Mt. McKinley Mutual Savings Bank	Fairbanks, Alaska	none
140.	United New Mexico Bank	Rio Rancho, New Mexico	February, '79
141.	First City National Bank	Hobbs, New Mexico	November, '80
142.	NONE National Bank	Charlotte, North Carolina	April, '72



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

143.	Bank of Star City	Star City, Arkansas	none
144.	First National Bank of Magnolia	Magnolia, Arkansas	February, '83
145.	Southern Bank and Trust Company	Greenville, South Carolina	February, '82
146.	United States National Bank of Oregon	Portland, Oregon	January, '72
147.	United Jersey Bank	Hackensack, New Jersey	May, '81
148.	First Citizens National Bank	Newport, New Hampshire	none
149.	BankEast	Manchester, New Hampshire	June, '80
150.	The Peoples National Bank of Hayward	Hayward, Wisconsin	none
151.	Bank of Sturgeon Bay	Sturgeon, Wisconsin	December, '75
152.	Bank of Gay Mills	Gay Mills, Wisconsin	none
153.	Western Greenbrier National Bank	Rainelle, W. Virginia	none
154.	The Guaranty National Bank of Huntington	Huntington, W. Virginia	October, '82
155.	First Security Bank of Idaho, N.A.	Boise, Idaho	September, '79
156.	Garrett National Bank of Oakland	Oakland, Maryland	none
157.	First Farmers and Merchants National Bank	Columbia, Tennessee	June, '82
158.	Citizens Bank of Sneedville	Sneedville, Tennessee	none
159.	Mid-South Bank and Trust Company	Murfreesboro, Tennessee	September, '76
160.	First American National Bank	Nashville, Tennessee	May, '76
161.	Apollo Trust Company	Apollo, Pennsylvania	September, '82
162.	Citizens National Bank in Windber	Windber, Pennsylvania	November, '83
163.	First Blair County National Bank	Tyrone, Pennsylvania	none
164.	Equibank	Pittsburgh, Pennsylvania	September, '69
165.	The First National Bank of Cincinnati	Cincinnati, Ohio	June, '80
166.	Bank One, Akron, N.A.	Akron, Ohio	October, '80
167.	The Richland Trust Company	Mansfield, Ohio	April, '83
168.	The First National Bank	Sidney, Ohio	November, '76
169.	Toledo Trust	Toledo, Ohio	June, '76
170.	The Binghamton Savings Bank	Binghamton, New York	November, '83
171.	Holstein State Bank	Holstein, Iowa	June, '83
172.	First Security Bank of Bozeman	Bozeman, Montana	September, '76



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

173.	Texas American Bank	Amarillo, Texas	July, '76
174.	Hawthorne Bank of Wheaton	Wheaton, Illinois	July, '54
175.	Chelsea Groton Savings Bank	Mystic, Connecticut	none
176.	Southeast Bank	Miami, Florida	May, '79
177.	Southeast Bank of Lee County	Cape Coral, Florida	January, '74
178.	Barnett Bank of Polk County	Lakeland, Florida	July, '51
179.	Sun Bank/Highlands, N.A.	Avon Park, Florida	none
180.	Barnett Bank of Central Florida	Winter Park, Florida	December, '79
181.	Valparaiso Bank and Trust Company	Valparaiso, Florida	June, '83
182.	The First National Bank of Clearwater	Clearwater, Florida	June, '83
183.	Florida National Bank	Miami, Florida	July, '80
184.	Riverlands National Bank in La Place	La Place, Louisiana	May, '80
185.	Second National Bank of Saginaw	Saginaw, Michigan	July, '76
186.	Peoples National Bank and Trust Company of Bay City	Bay City, Michigan	September, '76
187.	Ludington Bank and Trust Company	Ludington, Michigan	August, '83
188.	Byron Center State Bank	Byron Center, Michigan	May, '84
189.	The First National Bank of Lapeer	Lapeer, Michigan	none
190.	The Dart National Bank of Mason	Mason, Michigan	none
191.	First of America Bank- Muskegon	Muskegon, Michigan	April, '82
192.	City Bank and Trust Company, N.A.	Jackson, Michigan	September, '82
193.	The Ionia County National Bank	Ionia, Michigan	none
194.	First National Bank in Mount Clemens	Mount Clemens, Michigan	February, '80
195.	Comerica Bank- Kalamazoo	Kalamazoo, Michigan	September, '73
196.	First National Bank and Trust Company	Sturgis, Michigan	November, '79
197.	Hampshire National Bank of South Hadley	South Hadley, Massachusetts	none
198.	Rockland Trust Company	Rockland, Massachusetts	April, '51
199.	Winchester Savings Bank	Winchester, Massachusetts	September, '60



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

200.	Plymouth Savings Bank	Wareham, Massachusetts	June, '77
201.	Merrimac Savings Bank	Merrimac, Massachusetts	none
202.	Shawmut Bank of Bristol County, N.A.	New Bedford, Massachusetts	December, '83
203.	South Weymouth Savings Bank	South Weymouth, Massachusetts	August, '84
204.	Bank of New England- Barnstable Cty	Hyannis, Massachusetts	May, '84
205.	New Iberia National Bank	New Iberia, Louisiana	April, '81
206.	Liberty Bank and Trust Company	Greenswood, Louisiana	July, '84
207.	Cardwell Bank and Trust Company	Columbia, Louisiana	none
208.	Washington Bank and Trust Company	Franklinton, Louisiana	none
209.	Crestwood State Bank	Crestwood, Kentucky	December, '77
210.	The First National Bank of Central City	Central City, Kentucky	June, '52
211.	Horse Cave State Bank	Horse Cave, Kentucky	none
212.	First and Farmers Bank of Somerset, Inc.	Somerset, Kentucky	June, '79
213.	Bardwell Deposit Bank	Bardwell, Kentucky	September, '82
214.	Central Bank and Trust Company	Owensboro, Kentucky	August, '75
215.	Cumberland Valley Financial Corporation	London, Kentucky	April, '83
216.	The State National Bank	Maysville, Kentucky	none
217.	Hancock Bank and Trust Company	Hawesville, Kentucky	November, '78
218.	Citizens Bank and Trust Company	Glasgow, Kentucky	June, '80
219.	Elkton Bank and Trust Company	Elkton, Kentucky	October, '79
220.	The First National Bank of Pikeville	Pikeville, Kentucky	January, '84
221.	The First National Bank and Trust Co. of Corbin	Corbin, Kentucky	May, '83
222.	First National State Bank of South Jersey	Burlington, New Jersey	March, '73
223.	Merchants Savings Bank	Manchester, New Hampshire	April, '73
224.	First Bank of Ceredo	Ceredo, W. Virginia	October, '82
225.	Bank of Hawaii	Honolulu, Hawaii	November, '69
226.	Blount National Bank	Maryville, Tennessee	September, '81
227.	Jackson National Bank	Jackson, Tennessee	April, '78
228.	First State Bank of Claremont	Claremont, South Dakota	none
229.	Norwest Bank Sioux Falls N.A.	Sioux Falls, South Dakota	January, '75



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

230.	Bucks County Bank and Trust Company	Perkasie, Pennsylvania	December, '74
231.	Mid Penn Bank	Millersburg, Pennsylvania	June, '79
232.	Provident National Bank	Philadelphia, Pennsylvania	June, '77
233.	First Pennsylvania Bank, N.A.	Philadelphia, Pennsylvania	June, '80
234.	The First National Bank	Saxton, Pennsylvania	July, '84
235.	Citizens National Bank and Trust Company	Waynesboro, Pennsylvania	November, '82
236.	Pittsburgh National Bank	Pittsburgh, Pennsylvania	December, '70
237.	Johnstown Bank and Trust Company	Johnstown, Pennsylvania	May, '82
238.	Brookville National Bank	Brookville, Ohio	none
239.	The Savings Bank	Circleville, Ohio	August, '80
240.	Bank One, Dayton, N.A.	Dayton, Ohio	December, '76
241.	BancOhio National Bank	Columbus, Ohio	May, '72
242.	First National Bank of Akron	Akron, Ohio	September, '80
243.	The First National Bank of Dennison	Dennison, Ohio	none
244.	Marine Midland Bank	New York, New York	August, '73
245.	National Westminster Bank USA	New York, New York	May, '80
246.	Bank of California	San Francisco, California	January, '82
247.	The Citizens State Bank	Moundridge, Kansas	none
248.	Colorado National Bank Boulevard	Denver, Colorado	December, '79
249.	Trinity National Bank	Fort Worth, Texas	none
250.	Republic Bank Northwest, Austin, N.A.	Austin, Texas	none
251.	First Bank and Trust Company	Mount Vernon, Illinois	October, '83
252.	Hospital Trust National Bank	Providence, Rhode Island	September, '71
253.	First National Bank	Hartford, Alabama	none
254.	SouthTrust Bank of Alabama	Birmingham, Alabama	March, '72
255.	Atlantic Bank	Jacksonville, Florida	December, '75
256.	Citizens State Bank	Kingsland, Georgia	none
257.	Citizens Bank of Michigan City, Indiana	Michigan City, Indiana	August, '74
258.	Grenada Bank	Grenada, Mississippi	June, '84
259.	Northwest National Bank	Rensselaer, Indiana	none
260.	Michigan National Bank-Mid Michigan	Flint, Michigan	December, '79
261.	Farmers and Merchants Bank	Buckeye, Arizona	none
262.	West Bend Marine Bank	West Bend, Wisconsin	June, '80
263.	The Peru Trust Company	Peru, Indiana	April, '83
264.	The Tattnell Bank	Reidsville, Georgia	none



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

265.	The First National Bank of Hutchinson	Hutchinson, Minnesota	February, '82
266.	Bostwick Banking Company	Arlington, Georgia	none
267.	Georgia State Bank	Mableton, Georgia	June, '93
268.	The Fidelity Bank of Indiana	Carmel, Indiana	July, '82
269.	Security Bank and Trust Company	Glencoe, Minnesota	none
270.	The First National Bank of Elk River	Elk River, Minnesota	April, '82
271.	The First National Bank	Crookston, Minnesota	February, '76
272.	The Savings Bank of Manchester	Manchester, Connecticut	July, '81
273.	National City Bank of Rome	Rome, Georgia	July, '73
274.	Peoples Bank and Trust Company	North Carrollton, Mississippi	none
275.	Farmers Bank and Trust Co.	Madisonville, Kentucky	May, '84
276.	Blue Earth State Bank	Blue Earth, Minnesota	none
277.	First National Bank in Worthington	Worthington, Minnesota	March, '79
278.	Norwest Bank Metrowest, N.A.	Hopkins, Minnesota	December, '71
279.	Bank of Gonzales	Gonzales, Louisiana	March, '78
280.	First State Bank of New Brighton	New Brighton, Minnesota	October, '84
281.	First State Bank of New Germany	New Germany, Minnesota	none
282.	Melrose State Bank	Melrose, Minnesota	August, '83
283.	Merchants and Farmers Bank	Columbus, Mississippi	none
284.	The Citizens Bank of Pikeville	Pikeville, Kentucky	August, '80
285.	The Roseville Bank	Roseville, Minnesota	May, '75
286.	First State Bank	Holly Springs, Mississippi	none
287.	First State Bank of Finlayson	Finlayson, Minnesota	none
288.	Citizens State Bank	Roseau, Minnesota	none
289.	The Scott County State Bank	Scottsburg, Indiana	October, '82
290.	Currie State Bank	Currie, Minnesota	none
291.	The Connecticut Bank and Trust Company, N.A.	Hartford, Connecticut	March, '76



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

292.	Midwest Commerce Banking Company	Elkhart, Indiana	June, '72
293.	State Bank of Buffalo Lake	Buffalo Lake, Minnesota	none
294.	Bank South	Forest Park, Georgia	May, '63
295.	The First National Bank of Oblong	Oblong, Illinois	December, '81
296.	The First State Bank of Braham	Braham, Minnesota	none
297.	Etowah Bank	Canton, Georgia	May, '82
298.	Citizens Bank of Washington County	Sandersville, Georgia	December, '81
299.	Norwest Bank Dodge Center	Dodge Center, Minnesota	September, '80
300.	State Bank of Madison	Madison, Minnesota	none
301.	Karlstad State Bank	Karlstad, Minnesota	none
302.	Hancock Bank	Gulfport, Mississippi	June, '79
303.	The First National Bank of Atlanta	Augusta, Georgia	July, '74
304.	The First Bank of Minnesota	Stewart, Minnesota	none
305.	Citizens Bank of Ulm	New Ulm, Minnesota	September, '80
306.	Connecticut National Bank	Hartford, Connecticut	April, '80
307.	First National Bank of Jackson County	Jefferson, Georgia	none
308.	Farmers and Merchants Bank	Eatonton, Georgia	September, '74
309.	PSFS	Philadelphia, Pennsylvania	January, '82
310.	South Shore Bank	Quincy, Massachusetts	August, '83
311.	First Bank Spring Valley	Spring Valley, Minnesota	none
312.	The First Bank of Marianna	Marianna, Florida	May, '78
314.	FNE of Miami	Miami, Florida	October, '82
315.	The Citizens and Southern National Bank	Atlanta, Georgia	November, '71
316.	Deposit Guaranty National Bank	Jackson, Mississippi	June, '78
317.	Commercial Bank and Trust Company	Griffin, Georgia	December, '8-
318.	First National in Punta Gorda	Punta Gorda, Florida	March, '80

APPENDIX B

	<u>Name of Bank</u>	<u>State</u>	<u>Branch/ Unit</u>	<u>Month/Year ATM Adopted</u>
1.	Bank of Park Forest	IL	Unit	Non-Adopter
2.	Chelsea Groton Savings Bank	CT	Branch	Non-Adopter
3.	Citizen's State Bank	KS	Branch	Non-Adopter
4.	Dart National Bank of Mason	MI	Branch	Non-Adopter
5.	Farmers and Merchants Bank of Central California	CA	Branch	Non-Adopter
6.	Garrett National Bank of Oakland	MD	Branch	Non-Adopter
7.	Jefferson County Bank	WI	Branch	Non-Adopter
8.	Merchant's & Farmer's Bank	MS	Branch	Non-Adopter
9.	Merchantile of Macon	MO	Unit	Non-Adopter
10.	Mt. McKinley Mutual Savings Bank	AK	Branch	Non-Adopter
11.	Pitkin County Bank and Trust Company	CO	Unit	Non-Adopter
12.	Republic Bank Northwest, Austin, N.A.	TX	Unit	Non-Adopter
13.	Springfield State Bank	NB	Unit	Non-Adopter
14.	Texas Commerce Bank	TX	Unit	Non-Adopter
15.	Tri-County State Bank	IA	Branch	Non-Adopter
16.	Equibank	PA	Branch	9/69
17.	Bank of Hawaii	HA	Branch	11/69
18.	First Alabama Bank of Dothan	AL	Branch	10/71
19.	The Citizens and Southern National Bank	GA	Branch	11/71
20.	First Interstate Bank of Oregon	OR	Branch	1/72
21.	Banc Ohio National Bank	OH	Branch	5/72
22.	First Interstate Bank of Washington	WA	Branch	4/73
23.	Merchants Savings Bank	NH	Branch	4/73
24.	Old National Bank of Washington	WA	Branch	1/75
25.	Central Bank and Trust Company	KY	Branch	8/75
26.	First National Bank of Camden	AR	Branch	2/76
27.	First National Bank of Crookston	MN	Branch	2/76
28.	Connecticut Bank and Trust Company	CT	Branch	3/76
9.	Toledo Trust	OH	Branch	6/76
30.	First National Charter Bank	MO	Unit	10/76

<u>Name of Bank</u>	<u>State</u>	<u>Branch/ Unit</u>	<u>Month/Year ATM Adopted</u>
31. Bank One Dayton	OH	Branch	12/76
32. Plymouth Savings Bank	MA	Branch	6/77
33. Provident National Bank	PA	Branch	6/77
34. Raccoon Valley State Bank	IO	Branch	11/77
35. Jackson National Bank	TN	Branch	4/78
36. First Bank of Marianna	FL	Branch	5/78
37. Hancock Bank and Trust Company	KY	Branch	11/78
38. First Security Bank of Utah	UT	Branch	5/79
39. Southeast Bank	FL	Branch	5/79
40. Mid Penn Bank	PA	Branch	6/79
41. Howard Bank	VT	Branch	7/79
42. Bank of America	CA	Branch	8/79
43. National Bank of America	KS	Branch	8/79
44. Deforest-Morrisonville Bank	WI	Branch	9/79
45. First Security Bank of Idaho	ID	Branch	9/79
46. First National Bank and Trust Company	MI	Branch	11/79
47. Eastside Bank and Trust	KS	Unit	1/80
48. LaJolla Bank and Trust Company	CA	Branch	2/80
49. Connecticut National Bank	CT	Branch	4/80
50. American Bank of Rock Island	IL	Unit	5/80
51. National Westminster Bank USA	NY	Branch	5/80
52. BankEast	NH	Branch	6/80
53. Citizens Bank and Trust Company	KY	Branch	6/80
54. Pacific Western Bank	OR	Branch	7/80
55. Citizens Bank of ULM	MN	Branch	9/80
56. First Citizens Bank and Trust	NC	Branch	10/80
57. Chittenden Trust Company	VT	Branch	11/80
58. Community Trust Bank	IL	Unit	3/81
59. Bank of Farmington	IL	Unit	4/81
60. Rockland Trust Company	MA	Branch	4/81
61. First Peoples Bank of New Jersey	NJ	Branch	6/81
62. Barnett Bank of Polk County	FL	Branch	7/81
63. Blount National Park	TN	Branch	9/81
64. First National Bank of Oblong	IL	Unit	12/81
65. Bank of California	CA	Branch	1/82

	<u>Name of Bank</u>	<u>State</u>	<u>Branch/ Unit</u>	<u>Month/Year ATM Adopted</u>
66.	First Jersey National Bank	NJ	Branch	1/82
67.	Herkimer County Trust Company	NY	Branch	3/82
68.	First America Bank--Muskegon	MI	Branch	4/82
69.	First National Bank of Moline	IL	Unit	4/82
70.	Johnston Bank and Trust Company	PA	Branch	5/82
71.	Soy Capital Bank and Trust Company	IL	Unit	7/82
72.	Northwest National Bank	WA	Branch	8/82
73.	Apollo Trust Company	PA	Branch	9/82
74.	RNB of Miami	FL	Branch	10/82
75.	Mid-State Bank	CA	Branch	11/82
76.	First National State Bank of S. Jersey	NJ	Branch	3/83
77.	United Jersey Bank Mid-State	NJ	Branch	3/83
78.	Cumberland Valley Finac Company	KY	Branch	4/83
79.	Commerce of Wentzville	MO	Unit	6/83
80.	First National Bank of Clearwater	FL	Branch	6/83
81.	Georgia State Bank	GA	Branch	6/83
82.	Provident Bank of Maryland	MD	Branch	6/83
83.	South Shore Bank	MA	Branch	8/83
84.	Transworld Bank	CA	Branch	9/83
85.	Trans National Bank	CA	Branch	10/83
86.	Citizens National Bank in Windber	PA	Branch	11/83
87.	Community Bank and Trust, N.A.	WV	Branch	1/84
88.	First National Bank of Pikeville	KY	Branch	1/84
89.	The Reedsburg Bank	WI	Branch	1/84
90.	Farmers Bank and Trust Company	KY	Branch	5/84
91.	First National Bank	PA	Branch	7/84
92.	Liberty Bank and Trust Company	LA	Branch	7/84
93.	First State Bank of New Brighton	MN	Branch	10/84

APPENDIX C



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY
HARVILL BUILDING #76
(602) 621-1474 or 621-1053

July 5, 1984

Attn: Automated Teller Department
Wells Fargo Bank
444 South Flower Street
Los Angeles, California 91735

Dear Colleague:

I have been employed in the financial services industry approximately ten years. Presently, I am a Branch Manager with Home Federal Savings in Tucson, Arizona.

As we are all well aware, the financial services industry is undergoing rapid changes in both technology utilized and services offered. One particular area where technology and the customer have come together is the use of automated teller machines.

As part of my thesis research at the University of Arizona, I am conducting a national survey of managers of automated teller departments. Dr. David Tansik is the director of my thesis committee. The purpose of this survey is to determine when automated teller machines were first introduced into banks in order to understand the timing and process of the diffusion of this new technology through our industry. The high cost of printing and postage makes it unreasonable to survey every bank. You have been randomly selected as part of a national sample from the American Bank Directory (Spring 1984 Edition). Your participation is extremely important to insure that this survey will be representative of the diffusion of automated teller machines across the United States. The data that I need from you is simply the date (month and year) that your institution acquired its first automated teller machine. I have enclosed a self addressed, stamped post card for your convenience in responding.

Since the acquisition by a bank of automated teller machines and their use by customers would be a matter of public knowledge, this data would not seem to be proprietary. Therefore, I hope that you will take the several minutes necessary to fill in the post card and participate in this survey. If you have any questions concerning this survey you can call me at my office (602) 286-3202.

Thank you very much.

Sincerely,

Marvin F. Lozano

APPENDIX D

BayBank Middlesex
7 New England Executive Park
Burlington, Mass. 01803

Our firm's Automated Teller Machines were
acquired on 6 19 77 .
 Month Year

I would like a copy of the final report.

Please send to: Mr. Steven Lindberg
BayBank Middlesex-7 New England Execu-
tive Park EFT-10 th.Fl Burlington Mass.
01803

Marvin F. Lozano
Department of Management and Policy
College of Business and Public Administration
The University of Arizona
Tucson, Arizona 85721

Marvin F. Lozano
Department of Management and Policy
College of Business and Public Administration
The University of Arizona
Tucson, Arizona 85721

APPENDIX E

I am writing in reference to my recent letter regarding the month and year that your firm acquired its Automated Teller Machines. If you have already returned the survey, I thank you for your participation. Your response adds significantly to the success of this study. If for some reason you put the survey aside, please take the time now to complete it. If you have any questions feel free to call me at (602) 296-3202.
Marvin F. Lozano

Marvin F. Lozano
Department of Management and Policy
College of Business and Public Administration
The University of Arizona
Tucson, Arizona 85721

Marvin F. Lozano
Department of Management and Policy
College of Business and Public Administration
The University of Arizona
Tucson, Arizona 85721

APPENDIX F



THE UNIVERSITY OF ARIZONA

TUCSON, ARIZONA 85721

COLLEGE OF BUSINESS AND
PUBLIC ADMINISTRATION

DEPARTMENT OF MANAGEMENT AND POLICY

(602) 621-1474 OR 621-1053

October 13, 1984

Attn: Automated Teller Machine Department
Bank of Clayton
P.O. Box 406
Clayton, Georgia 30525

Dear Colleague,

Thank you very much for your participation in our national survey of managers of automated teller machine departments. The response by your peers has been very favorable. It is extremely important that I ask for your assistance one more time. In order to properly evaluate the data you have already provided, we need to obtain copies of your 1973, 1978 and 1983 annual reports. Xerox copies are quite acceptable if original copies are out of stock.

Your continued participation is necessary to insure that this survey will be representative of the diffusion of automated teller machines across the United States. We hope to analyze annual report data to ascertain whether there are important differences between banks that have or do not have ATMs.

I hope you complete your participation in this survey by sending me copies of the annual reports. If you have any questions concerning this survey, you can call me at my office (602) 296-3202.

Marvin F. Lozano
Department of Management and Policy
College of Business and Public Administration
The University of Arizona
Tucson, AZ 85721

If there is any charge, please send me an invoice.

Sincerely,

Marvin F. Lozano

APPENDIX G

I am writing in reference to my recent letter regarding obtaining copies of your annual reports or xerox copies for the years 1973, 1978 and 1983. If you have already responded to my letter, I thank you for your participation. Your response adds significantly to the success of this study. If for some reason you have not responded to my letter, please take the time to do so now. If you have any questions feel free to call me at (602) 296-3202. Thank you.
Marvin F. Lozano

Marvin F. Lozano
Department of Management and Policy
College of Business and Public Administration
The University of Arizona
Tucson, Arizona 85721

Attn: Automated Teller Machine Department
The Union National Bank of Streator
201 East Main Street
Streator, IL 61364

APPENDIX H

BRANCH AND UNIT STATES
DECEMBER 31, 1983

<u>UNIT STATES</u>	<u># OF BANKS</u>	<u>%</u>	<u># SELECTED FOR THIS STUDY</u>
Illinois	1,272	20.91	21
Texas	1,639	26.94	27
Colorado	394	6.48	6
Kansas	621	10.21	10
Missouri	696	11.44	11
Montana	172	2.83	3
Nebraska	469	7.71	8
N. Dakota	189	3.11	3
Oklahoma	519	8.53	9
Wyoming	112	1.84	2
Totals = 10	6,083	100.00%	100

<u>BRANCH STATES</u>	<u># OF BANKS</u>	<u>%</u>	<u># SELECTED FOR THIS STUDY</u>
California	419	4.95	19
Arizona	43	.51	2
Utah	63	.75	3
Vermont	33	.39	2
Virginia	135	1.60	6
Washington	140	1.66	7
W. Virginia	204	2.41	10
Wisconsin	379	4.48	18
Nevada	13	.15	1
New Hampshire	120	1.42	6
New Jersey	184	2.18	9
Alabama	287	3.39	14
Alaska	15	.18	1
Arkansas	262	3.09	12
New Mexico	93	1.09	4
New York	270	3.19	13
N. Carolina	79	.93	4
Ohio	340	4.02	16
Pennsylvania	345	4.08	16
Rhode Island	22	.26	1
S. Carolina	80	.95	4
S. Dakota	146	1.73	7
Tennessee	331	3.91	16

<u>BRANCH STATES</u>	<u># OF BANKS</u>	<u>%</u>	<u># SELECTED FOR THIS STUDY</u>
Oregon	75	.89	4
Connecticut	109	1.29	5
Delaware	28	.33	1
Florida	460	5.44	22
Kentucky	335	3.96	16
Louisiana	284	3.36	13
Maine	51	.60	2
Maryland	93	1.09	4
Massachusetts	259	3.06	12
Michigan	371	4.39	18
Minnesota	751	8.88	35
Mississippi	154	1.82	7
Georgia	410	4.85	19
Hawaii	11	.13	1
Idaho	24	.28	1
Indiana	397	4.69	19
Iowa	640	7.57	30
	<hr/>	<hr/>	<hr/>
Totals = 40	8,455	100.00%	400

LIST OF REFERENCES

- Astley, W. G. 1978. "Sources of Power in Organizational Life," Unpublished Paper.
- Baldrige, J. V. and Burnham, R. A. 1975. "Organizational Innovation: Individual, Organizational, and Environmental Impacts," Administrative Science Quarterly.
- Ballard, M. 1984. "Attacking the Machines (ATM)," Canadian Banker.
- Bean, A. 1972. "Coupling the Management Science Function to User Groups: Some Observations on the Implementation of Management Science Projects in the Marketing Area." Ph.D. dissertation, Graduate School of Management, Northwestern University.
- Becker, S. and Whisler, T. 1967. "The Innovative Organization: A Selective View of Current Theory and Research," Journal of Business.
- "Behind the Banking Turmoil," Business Week, October 29, 1984, p. 100, No. 2866, McGraw-Hill.
- Beyer, J. M. and Trice, H. M. 1978. Implementing Change, New York, Free Press.
- Bingham, R. 1976. The Adoption of Innovation by Local Government, Lexington, Massachusetts, Heath.
- Bourgeois, L. J. 1981. "On the Measurement of Organizational Slack," Academy of Management Review.
- Bourgeois, L. J. and Singh, J. V. 1983. "Organizational Slack and Political Behavior within Top Management Teams," Unpublished Paper.
- Brown, A. and Weiner, E. 1984. "How to Make your Ability to Cope with Change an Effective Tool for Survival," Management Review.

- Chase, Richard B., Gregory B. Northcarft and Gerrit Wolf. 1984. "Designing High-Contact Service Systems: Application to Branches of a Savings and Loan," Decision Sciences.
- Corwin, R. 1972. "Strategies for Organizational Innovation: An Empirical Comparison," American Sociological Review.
- Crain, R. 1966. "Fluoridation: The Diffusion of an Innovation among Cities," Social Forces.
- Cyert, R. M. and March, J. G. 1963. A Behavioral Theory of the Firm, Englewood Cliffs, New Jersey, Prentice-Hall.
- Downs, A. 1967. Inside Bureaucracy, A Rand Corporation Research Study, Boston, Massachusetts, Little Brown and Company.
- Duncan, R. B. 1972. "Organizational Climate and Climate for Changes in Three Police Departments: Some Preliminary Findings," Urban Affairs Quarterly.
- Evan, W. H. 1966. "Organizational Lag," Human Organization.
- Feller, I., Menzel, D. and Engel, A. 1974. "Diffusion of Technology in State Mission Oriented Agencies," The Pennsylvania State University, Report to the National Science Foundation, Grant DA-39696.
- Fennell, M. L. 1984. "Synergy, Influence, and Information in the Adoption of Administrative Innovations," Academy of Management Journal.
- French, R. E. 1983. "Comparative Analysis of the Performance of Minority Owned Commercial Banks during the 1970s," The Social Service Journal, Vol. 2, No. 1.
- Galbraith, J. 1973. Designing Complex Organizations, Reading, Massachusetts, Addison-Wesley.
- Hage, J. 1965. "An Axiomatic Theory of Organizations," Administrative Science Quarterly.

- Hambrick, D. C. and Snow, C. C. 1977. "A Contextual Model of Strategic Decision Making in Organizations," Academy of Management Proceedings.
- Hannan, T. H. and McDowell, J. M. 1984. "The Determinants of Technology Adoption: The Case of the Banking Firm," Rand Journal of Economics.
- Humphrey, J. W. 1984. "Adapting to Change," Canadian Banker.
- Kaluzny, A. D. 1974. "Innovation in the Health System: A Selective Review of System Characteristics and Empirical Research," Health Services Research.
- Kaluzny, A. D. and Sprague, J. B. 1984. "Innovation in Health and Welfare Organizations: A Review and Critique of Current Theory and Research," in A. D. Kaluzny, J. T. Gentry, Innovation in Health Care Organizations, University of North Carolina, Chapel Hill.
- Kaluzny, A. D., et al. 1973. "Predicting Two Types of Program Innovation from Organizational Characteristics: The Case of Hospitals," Unpublished Paper.
- Kanter, R. M. 1983. The Change Masters: Innovations for Productivity in the American Corporation, New York, Simon and Schuster.
- Katz, E., et al. 1963. "Traditions of Research on the Diffusion of Innovations," American Sociological Review.
- Kimberly, J. R. 1978. "Hospital Adoption of Innovation: The Role of Integration into External Informational Environments," Journal of Health and Social Behavior.
- Kimberly, J. R. and Evanisko, M. J. 1981. "Organizational Innovation: The Influence of Individual, Organizational, and Contextual Factors on Hospital Adoption of Technological and Administrative Innovations," Academy of Management Journal.

- Mahajan, V. and Schoeman, M. E. F. 1977. "The Use of Computers in Hospitals: An Analysis of Adopters and Nonadopters," Interfaces.
- Mansfield, E. 1961. "Technical Change and the Rate of Imitation," Econometrica.
- _____ 1963a. "The Speed of Response of Firms to New Techniques," Quarterly Journal of Economics.
- _____ 1963b. "Intrafirm Rates of Diffusion of an Innovation," Journal of Political Economy.
- _____ 1963c. "Size of Firm, Market Structure, and Innovation," Journal of Political Economy.
- Mitroff, I. I. and Emshoff, J. R. 1979. "On Strategic Assumption Making: A Dialectical Approach to Policy and Planning," Academy of Management Review.
- Moch, M. K. and Morse, E. V. 1977. "Size, Centralization and Organizational Adoption of Innovations," American Sociological Review.
- Mohr, L. B. 1969. "Determinants of Innovation in Organizations," American Political Science Review.
- Morrissey, W. J. and McCormick, Jr., R. L. 1986. "Does Merging or Staying Independent Affect Commercial Lending," Journal of Commercial Bank Lending.
- Myers, S. and Marquis, D. G. 1969. Successful Industrial Innovations, National Science Foundation: NSF 69-17.
- Mytinger, R. E. 1968. "Innovation in Local Health Services: A Study of the Adoption of New Programs by Local Health Departments with Particular Reference to New Health Practices, Washington, D.C.," U.S. Department of Health, Education and Welfare, Public Health Service, Division of Medical Care Administration.
- Naisbitt, John. 1982. Megatrends, New York, Warner Books, Inc.

- Radnor, Michael, Albert Rubenstein and Alden Bean. 1968. "Integration and Utilization of Management Science Activities in Organizations," Operations Research Quarterly.
- Radnor, Michael, Albert Rubenstein and David Tansik. 1970. "Implementation in Operations Research and R & D in Government and Business Organization," Operations Research.
- Rogers, E. M. 1962. Diffusion of Innovations, New York, Free Press of Glencoe.
- _____ 1969. Modernization among Peasants: The Impact of Communication, New York: Holt, Rinehart and Winston.
- _____ 1983. Diffusion of Innovations, New York, Free Press.
- Rogers, E. M. and Shoemaker, F. F. 1971. Communication of Innovations: A Cross-Cultural Approach, New York, Free Press.
- Ross, D. H. 1958. Administration for Adaptability: A Source Book Drawing Together the Results of More than 150 Individual Studies Related to the Question of Why and How Schools Improve, New York, Metropolitan School Study Council.
- Sanford, C. S. 1986. "Transforming Bankers Trust from Retail to Wholesale," Planning Review.
- Schien. 1969. Process Consultation: Its Role in Organization Development, Reading, Mass.: Addison-Wesley.
- Thompson, J. D. 1967. Organizations in Action, New York, McGraw-Hill.
- Thompson, Victor A. 1969. Bureaucracy and Innovation, University, Alabama: University of Alabama Press.
- Tilton, John E. 1971. International Diffusion of Technology: The Case of Semiconductors. Washington, D.D.: The Brookings Institute.

- Walker, J. L. 1969. "The Diffusion of Innovations among the American States," American Political Science Review.
- Wilson, J. Q. 1966. "Innovation in Organizations: Notes toward a Theory," Approaches to Organizational Design.
- Zaltman, Gerald, Robert Duncan and Jonny Holbeck. 1973. Innovation and Organizations, New York, Wiley.
- Zaltman, Gerald and George Brooker. 1971. A New Look at the Adoption Process, Working Paper Northwestern University.
- Zimmer, L. F. 1981. "ATM Acceptance Grows," The Magazine of Bank Administration.
- _____ 1984. "ATMs 1983: A Critical Assessment," The Magazine of Bank Administration.
- _____ 1986. "The Future of ATM Products and Services," The Magazine of Bank Administration.