INFORMATION TO USERS

This was produced from a copy of a document sent to us for microfilming. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help you understand 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 you of complete continuity.

2. When an image on the film is obliterated with a round black mark it is an indication that the film inspector noticed either blurred copy because of movement during exposure, or duplicate copy. Unless we meant to delete copyrighted materials that should not have been filmed, you will find a good image of the page in the adjacent frame. If copyrighted materials were deleted you will find a target note listing the pages in the adjacent frame.

3. When a map, drawing or chart, etc., is part of the material being photographed the photographer has followed a definite method in “sectioning” the material. 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 any illustrations that cannot be reproduced satisfactorily by xerography, photographic prints can be purchased at additional cost and tipped into your xerographic copy. Requests can be made to our Dissertations Customer Services Department.

5. Some pages in any document may have indistinct print. In all cases we have filmed the best available copy.
Berry, Mary Ann

A STUDY OF ATTITUDES TOWARDS TECHNOLOGY

The Ohio State University

University Microfilms International 300 N. Zeeb Road, Ann Arbor, MI 48106

Ph.D. 1982
A STUDY OF ATTITUDES TOWARDS TECHNOLOGY

DISSERTATION

Presented in Partial Fulfillment of the Requirements
for the Degree Doctor of Philosophy in the
Graduate School of The Ohio State University

By

Mary Ann Berry, B.Sc., M.A.

* * * * *

The Ohio State University

1982

Reading Committee:

Dr. Ted L. Napier
Dr. G. Howard Phillips
Dr. Donald W. Thomas

Approved By

Adviser

Department of Agricultural Economics & Rural Sociology
ACKNOWLEDGEMENTS

During the several years I have devoted full-, part-, or zero-time to completing my doctoral program, changes in my life have been the rule, not the exception. There have been, however, several individuals whose support has been exceptionally constant.

My parents, James O. and Virginia M. Terrell Berry, deserve especial appreciation. Not only did they give me the gift of life, but their support, encouragement, and love have made my life richer. It was my good fortune to grow up in a home where I was encouraged to explore my full potential as a human being. Not until I left home did I hear that women were supposed to aspire to less than their fullest potentials.

My sister, E. Maureen Berry Drobot, has been a source of support and friendship throughout my life. How fortunate I have been to have such a special person for a sister and friend.

My advisor, Dr. Ted L. Napier, must be recognized and thanked for he is the one person who bore the burden of my unbridled rages, my temper tantrums, my petulance, and my procrastinations during my doctoral studies.
Finally, three special individuals must be noted. They were always there whether I needed them or not, offering complaints and companionship with equal fervour—Little Stuff, Tweedle-Dee, and Loni.

I would also like to thank Kathy J. Mattfeld and Jill Loar for their conscientious work in preparing this typed document. Kathy's beautiful disposition and her willingness to adjust her schedule to fit my erratic productivity were greatly appreciated. Jill's accurate and prompt attention to each detail concerning my revisions of this document did much to assuage my anxiety regarding deadlines. Both Kathy and Jill have made the task of producing this final document so much more enjoyable.
VITA

17 October 1946
Born. Highland, Ohio.

1969
B.Sc., The Ohio State University, Columbus, Ohio.

1970
M.A., The Ohio State University, Columbus, Ohio.

1970-1972
Research Specialist, Computer-Assisted Instruction, The Ohio State University, Columbus, Ohio.

1972-1976
Research Associate, Department of Agricultural Economics and Rural Sociology, The Ohio State University, Columbus, Ohio.

1977-1979
Researcher, Office of Research, Ohio Department of Economic and Community Development, Columbus, Ohio.

1979-1982
Computer Instruction Specialist, Ohio Cooperative Extension Service, The Ohio State University, Columbus, Ohio.

FIELDS OF STUDY

Major Field: Rural Sociology
Studies in Community Development. Dr. G. Howard Phillips
Studies in Rural Sociology. Dr. Donald W. Thomas
Studies in Sociological Theory. Dr. John Seidler
TABLE OF CONTENTS

ACKNOWLEDGEMENTS ......................................... ii
VITA ........................................................ iv
LIST OF TABLES .............................................. vii
INTRODUCTION ............................................. 1

Chapter

1. LITERATURE REVIEW AND THEORY ...................... 11
   The Development of a New Belief System. ......... 22
   Rationalism as the Root of Contemporary
   Social Thought. ........................................ 25
   Basic Tenets of the New Belief System as
   Summarized in the Industrialism, Social
   Scale, and Technique Literatures. ........... 42
   Sociological Theory and Utilitarianism. .... 47
   The Convergence of Rationalism and
   Utilitarianism in Modern Social Exchange
   Theory. .................................................... 54
   Application of the Utilitarian Orientation
   to Attitude Towards Technology. ............. 61
   Variables and Hypotheses. ....................... 62
   Theoretical Synthesis ............................... 76

2. RESEARCH METHODOLOGY ................................. 78
   The Area of Study .................................... 78
   Sample Selection. .................................... 79
   Instrument Construction ............................. 82
   Operationalization of the Independent
   Variables ................................................ 83
   Adjustment to the Employment Status
   Variable. ................................................ 84
   Operationalization of the Attitude
   Variable. ............................................... 86
   Reliability of the Attitude Scale .......... 87
   Analyses Used to Test the Theoretical
   Model .................................................... 89
<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. RESEARCH FINDINGS.</td>
<td>94</td>
</tr>
<tr>
<td>Responses to the Attitude Items</td>
<td>94</td>
</tr>
<tr>
<td>Multiple Correlation Analysis</td>
<td>98</td>
</tr>
<tr>
<td>Analyses of Variance</td>
<td>100</td>
</tr>
<tr>
<td>Summary of Findings</td>
<td>111</td>
</tr>
<tr>
<td>Supplemental Analyses: Selection of Alternate Variables</td>
<td>111</td>
</tr>
<tr>
<td>Supplemental Analyses: Operationalization of Alternate Independent Variables</td>
<td>118</td>
</tr>
<tr>
<td>Analyses Used to Test Alternate Variables</td>
<td>120</td>
</tr>
<tr>
<td>Supplemental Analyses: Pearson Correlation Analyses</td>
<td>123</td>
</tr>
<tr>
<td>Supplemental Analyses: Analyses of Variance Results</td>
<td>125</td>
</tr>
<tr>
<td>Summary of Supplemental Analyses Findings</td>
<td>129</td>
</tr>
<tr>
<td>4. SUMMARY AND CONCLUSIONS.</td>
<td>131</td>
</tr>
<tr>
<td>Discussion of the Theoretical Model and the Findings</td>
<td>133</td>
</tr>
<tr>
<td>Implications for Further Research</td>
<td>139</td>
</tr>
<tr>
<td>LIST OF REFERENCES</td>
<td>142</td>
</tr>
</tbody>
</table>
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Sample Frequencies and Summary Statistics for the Independent Variables</td>
<td>81</td>
</tr>
<tr>
<td>2.</td>
<td>Sample Frequencies and Summary Statistics for Unadjusted and Adjusted Employment Status Variable</td>
<td>85</td>
</tr>
<tr>
<td>3.</td>
<td>Ten-Item Attitude Towards Technology Scale and Weighting Values for Each Item</td>
<td>88</td>
</tr>
<tr>
<td>4.</td>
<td>Correlation Matrix and Standardized Item Alpha Reliability Coefficient for Attitude Towards Technology Scale</td>
<td>90</td>
</tr>
<tr>
<td>5.</td>
<td>Response Frequencies for Each Scale Item Composing the Attitude Towards Technology, Presented as Absolute Frequencies and as Percentages</td>
<td>95</td>
</tr>
<tr>
<td>6.</td>
<td>Observed Correlation Matrix for Selected Variables and Attitude Towards Technology</td>
<td>99</td>
</tr>
<tr>
<td>7.</td>
<td>Summary Statistics of the Stepwise Regression of Attitude Towards Technology Scale with Selected Independent Variables</td>
<td>101</td>
</tr>
<tr>
<td>8.</td>
<td>Summary of One-Way Analysis of Variance of Attitude Towards Technology by Occupation</td>
<td>103</td>
</tr>
<tr>
<td>10.</td>
<td>Summary of One-Way Analyses of Variance of Attitude Towards Technology by Employment Status</td>
<td>110</td>
</tr>
<tr>
<td>11.</td>
<td>Sample Frequencies and Summary Statistics for the Alternate Variables</td>
<td>116</td>
</tr>
<tr>
<td>Table</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>12.</td>
<td>Pearson Product-Moment Correlation Coefficients for Selected Alternate Variables and Attitude Towards Technology</td>
<td>124</td>
</tr>
<tr>
<td>13.</td>
<td>Summary of One-Way Analyses of Variance of Attitude Towards Technology by Work Skills, Local Employment Potential for Children, and Type of Company</td>
<td>126</td>
</tr>
<tr>
<td>14.</td>
<td>Summary of One-Way Analysis of Variance of Attitude Towards Technology by Type of Company, with Extractive-Type Companies Excluded</td>
<td>129</td>
</tr>
</tbody>
</table>
INTRODUCTION

The primary purpose of this research is to investigate the attitudes of rural residents towards technological means of problem solution. A theoretical framework, based on the growth ethos, is developed and used to derive hypotheses about perceptions of technology.

It has been argued that the push for economic growth has been fostered by an all-encompassing growth ethos with its distinct and predictable action set. This ethos posits that more complex technologies and organizational structures are good and desirable goals to be achieved because growth is indicative of progress which is also defined as a good and desirable condition. Indeed, the valuing of growth and progress has become a directing force of action (Bury, 1932).

The growth ethos as conceptualized in this research has two major components: growth and progress. Of the two, progress is more difficult to define and nearly impossible to measure objectively because it is subject to individual and group definition and interpretation. In his cogent discussion of progress Bierstedt (1963) makes the following observations: (1) If progress is defined as development in
a desired direction, the researcher must face the fact that what is desirable for one person or group may be anathema for another person or group, and (2) The concept, progress, has been generally abandoned for sociological use because attempts to define it objectively have been met with less than lukewarm approval. The component, growth, on the other hand, does not paralyze an investigation in a definitional and empirical miasma. Because growth denotes movement or change without the confounding element of human desire, method (the "how") is primary. In the growth ethos, the growth component is the "means," the "how," and the primary driving force of progress.

The growth ethos places considerable emphasis on achieving and maintaining steady expansion in the economic sector of a society. Stagnation or decline in the economy is viewed with considerable concern. It should be noted that this valuing of growth cannot be summed up in the phrase, "growth for the sake of growth." Rather, the valuing of growth must be considered in conjunction with the valuing of progress. Growth controlled through planning and engineering is a more accurate representation of how growth is perceived in the growth ethos. More emphasis is placed on the "how." High value is placed on ways of doing things, on means, methods, and techniques. This valuing of economic growth (method) is non-utopian in the sense that no ultimate end-state is envisioned. The means to an end have become
ends in themselves. An ultimate end-state has been supplanted by an amorphous, fluctuating state of becoming or evolving.

In social systems where such a growth ethos prevails, geographic areas experiencing economic stagnation or decline present problems to be solved. This problem-solving orientation is firmly rooted in two cornerstone elements of this growth ethos: (1) The human being is an active, thinking agent whose reason is a source of knowledge superior to, and separate from, sense perceptions, and (2) Man's experience and reason, combined, are fundamental in solving problems. Human action arises from the careful, thorough analysis of probable results and the determination of what method should most efficiently remedy the no-growth or decline situation. It is assumed that when method is improved, solutions to problems will follow. The evaluation of what constitutes improved method is, therefore, seen as problem resolution. The primary criterion for selecting as well as evaluating method is maximum efficiency. Ellul (1964) has labelled this commitment to efficiency "the dictatorship of maximum efficiency."

In this research "development strategy" is conceptualized as method, means, and technique of problem solving. An economically-oriented development strategy is most often formulated for the purpose of solving the problems associated with economic decline or stagnation in a geographic
area. Advocates of such a development strategy claim that new jobs for local people will be created and new income sources will be generated if the local people follow the strategy's procedures. An added claim, found especially in rural-oriented development strategies, is that the new jobs and income sources will keep the local young adults in the area. The promise of new jobs, new income sources, and the possible reversal of the "youth drain" from rural areas is often considered an investment in the future, i.e., a progress orientation, and a revitalization of a declining area, i.e., a growth orientation.

At this point, it may be interjected that basic development concerns are not too dissimilar. Where major concerns in many rural areas tend to include the lack of jobs, insufficient income sources, and the exodus of local young adults to "the city," major concerns in many urban areas include the shift of jobs, income sources, and people from the center city to the suburbs. While rural strategies tend to emphasize development, urban development strategies often emphasize redevelopment. What cannot be overlooked is that development strategies, whether rural- or urban-oriented, tend to be action plans drawn up to promote growth and progress, the two major components of the growth ethos. This suggests that the growth ethos is pervasive throughout the society.
There are numerous methods for achieving economic growth. In recent years domestic development experts have been evaluating industrialization as a development strategy. This method has been given particular attention in those rural areas which have been experiencing economic decline or stagnation. The impact research has indicated that industrialization has not proven to be the cure-all for economic and social decline in these lesser-developed areas. In fact, some studies have shown that industrial development has sometimes introduced new sets of problems into already problem-plagued areas (Summers, et al., 1976), a less than efficient way to remedy a problem. In addition to the not overwhelmingly favorable research studies, there have been increasingly vocal and active groups of private citizens and development experts challenging the notion of industrial development as the cure-all for an area's economic and social woes. Some opponents claim that, at best, the industrial development strategy may be no more than a placebo, a diversion to placate the masses; at worst, a treatment more debilitating than the disease.

Challenges to the industrial development strategy tend to center on magnitude, direction, and/or goal-definition differences. Often industrial development, per se, is not completely rejected. Instead, smaller-scale industrial-type development is advocated. Proponents of this strategy argue that maximum technological efficiency can be more easily
achieved with the smaller industrial plant because it can be more efficiently planned and managed. Smaller plants are not usually as complex as larger plants. A smaller-scale industrial development strategy may require a longer time to remedy an area's economic woes, but growth, it is argued, will occur. Such development methods, the smaller-scale proponents insist, tend to be well organized and engineered with controlled growth, not the wildly topsy, unpredictable growth that all too often characterizes large-scale industrial development.

The transportation and communications development strategy, derived from modernization theory, is another alternative to the industrial development model. Proponents of the transportation model hold that there are distinct steps in societal development and that these development stages are lock-step in configuration. To set an industry in the middle of a lesser-developed area would be sheer folly, they argue. Too many necessary components for an efficient and successful industry would be missing or not fully developed, frequently dooming the development effort to failure. A carefully engineered "opening up" of the lesser-developed area, via modern transportation and communication networks, would gradually remedy the area's economic malaise and set the stage for subsequent development efforts.

Other development experts argue that the direction of development efforts should be tailored to the target area.
Why, they ask, should the cost of attracting and establishing an industrial plant within an economically declining or stagnating area be incurred when the area has abundant natural resources? The development effort should center around these natural resources, e.g., coal, oil, timber, or wildlife. New jobs and increased income sources would result from this type of natural resource development, and the time and cost involved in "selling" the people living in the area on some development option would most likely be minimized or eliminated.

If criticisms of the industrial development strategy focus on goal definition differences, non-industrial type development strategies are most likely to be cited as viable alternatives. What is important to bear in mind is that neither growth, per se, nor planning and management, nor progress, per se, are challenged. Differences tend to focus on definitions of progress.

One of the most often mentioned non-industrial development strategies is outdoor recreation development. Supporters of the outdoor recreation development strategy suggest that the wise management of already existing recreation facilities or the planning of new outdoor recreation facilities will generate economic growth in lesser-developed areas. They suggest that the U.S. labor force has created a client group in search of ways to fill the increased leisure
time. What better way to spend their time and money, outdoor recreation development proponents ask, than in the great outdoors? These advocates, however, tend to argue for a well-engineered, planned, and efficiently-managed great outdoors. Such developers suggest that everyone has a touch of Gauguin, but few will set sail for the South Pacific. There are more Ralph Waldo Emersons than Henry David Thoreaus. The sylvan escape from the noise, dirt, and regimentation of urban living could be a reality for nearly everyone. Wise planning and development of outdoor recreation installations could meet this alleged desire for the escape to nature as well as halt the decline or stagnation of an economically hard-pressed geographic area. Ideal target areas for outdoor recreation development would be exactly these areas most in need of development, the lesser-developed non-growing rural areas of the United States.

Such outdoor recreation facilities, of course, most often require advanced technologies to access and to use them efficiently. Extensive transportation systems must be implemented to provide the "leisure-seekers" the opportunity to use the recreation facilities. Thus, recreation development strategies tend to be quite technologically oriented. Indeed, it seems that without technology none of the development options is possible.

When these several development strategies are analyzed, certain patterns of similarities and differences may be
discerned. Regardless of differences in philosophical particulars these development strategies are, in general, growth-oriented. That is, any one strategy is touted as a way to halt and/or to reverse economic and population decline and/or stagnation in lesser-developed areas. Certain key concepts appear repeatedly in each of the strategies, e.g., maximum efficiency, management, planning, engineering, growth, and progress.

This study, then, is designed to evaluate attitudes towards technology and to examine possible explanatory factors of these attitudes. The starting point of this research design is that the growth ethos is firmly rooted in the philosophical tradition called rationalism. This will be demonstrated by tracing the rationalist tradition to its roots and presenting a distillation of the major components of rationalism. Discussion will then move to three theoretical perspectives derived from the rationalist model: industrialism from economics, social scale from anthropology and sociology, and technique from mid-1960's French social philosophy, political science, and sociology. The commonalities among these three perspectives will be emphasized and an attempt will be made to show that they do relate to the major components of rationalism. Stratification theory, the social-psychological perspective, sometimes called "the modern man perspective" (Lauer, 1977), and social exchange
theory will be used to derive hypotheses concerning possible explanatory factors of attitudes towards technology.

What is particularly exciting about this research is that it is an attempt to examine in a systematic way attitudes towards technology, one characteristic often used to contrast traditional from modern society. How do people view technology? What do people who highly value technology have in common, and vice versa? These questions, too, are being asked more and more in everyday life as the hardware reality of technology becomes a major factor in the modern man's life.
CHAPTER 1
LITERATURE REVIEW AND THEORY

By the middle of the sixteenth century Western Europe could be described as a region in the midst of spiritual and intellectual chaos (Lund, et al., 1971). Two zeitgeist-shattering events had challenged the heretofore absolutely certain Medieval order of all existence, an order which had been codified in exquisite detail by the great thirteenth century scholar, Thomas Aquinas. The totality of existence, Aquinas had argued, was formed through the interplay of the two layers of existence, based ultimately on the two authorities: authority by revealed faith and authority by reason (Brinton, et al., 1960a; Lund, et al., 1971). The dualism of the Thomist system which became the central view of orthodox Roman Catholic Christianity extended into all spheres of existence: cultural, social, political, and economic (Brinton, et al., 1960a; Lund, et al., 1971).

The first systematic challenge to this Medieval system of order was issued by Martin Luther on 31 October 1517 (Brinton, et al., 1960a). In his 95 Theses, Luther centered his arguments on the long-standing theological issue of faith and good works (Brinton, et al., 1960a) and, in the process, set down a radical view of the nature of the
man/God relationship (Lund, et al., 1971). Luther argued that man is justified through faith, alone, and that the relationship between God and man (individual human beings) is a personal one, thereby shifting theological attention from heaven and grace to man-on-earth and faith. Luther's doctrinal break with the Church led to a complete separation within the Church and to the establishment of a new Church touted as the one true Church (Brinton, et al., 1960a). The religious unity of Medieval Europe had been shattered (Brinton, et al., 1960a).

Nearly twenty years after Luther's initial challenge to Church doctrine and practice, John Calvin provided a solid doctrinal basis for Protestantism in his Institutes of the Christian Religion (Brinton, et al., 1960a). In addition to providing logical clarity for a complete break with the Christian Church centered in Rome, Calvin set down ethical and behavioral prescriptions for true followers of Christ. Calvin emphasized theology, worship, education, thrift, ethical behavior, representative government for his followers, and hard work (Lund, et al., 1971). Efficiency and results were valued because involvement in successful, efficient works might mark a person as among the chosen for salvation (Lund, et al., 1971). Although Calvin's and Luther's views on the nature of the man/God relationship differ, both had similar conceptualizations about the nature of man. As did Luther, Calvin highlighted the individual
human being as an acting, thinking agent. Indeed, as Brinton, et al., (1960a) suggest, early Protestantism gave the modern Western world **individualism**.

The second systematic challenge to the Medieval system of order came from the scientific community, in general, and from astronomy, in particular. In his landmark book, *Concerning the Revolution of Heavenly Bodies* (1543), Copernicus attacked the astronomy of Ptolmey and other ancient astronomers. Copernicus argued that the sun, not the earth, was the center of the universe. The music of the spheres had been found to be somewhat out of tune. Along with the later studies and speculations of such people as Bruno (all is relative in space) and Kepler (planetary orbits around the sun are elliptical, not circular), Copernicus' work initiated the eventual disruption of the old view of an orderly, earth-centered universe inhabited by man, the child of God, the most favored of God's creatures (Brinton, et al., 1960a; Durant and Durant, 1961; Lund, et al., 1971). No leap of faith and no amount of tortuous Scholastic argument could make the eyes and mind deny what Copernicus and others calculated, deduced, and/or observed to be fact. These findings in astronomy, mathematics, and physics pushed back the boundaries of knowledge, and individual man on earth confronted a limitless universe (Brinton, et al., 1960a; Lund, et al., 1971).
In a period of less than fifty years, then, the absolute certainty of the Medieval dualistic cosmos had been eroded by doubt. There were new views of man, the earth, the universe, ethics, the state, and Christianity, as well as the new scientific gains. What was needed was a firm philosophical foundation for this new knowledge since the Medieval Aristotelian-Thomist system's position that divine revelation carried human reason beyond its limitations was not an adequate dogma for the new knowledge (Bernal, 1971; Lund, et al., 1971). Indeed, the Church, the proponent of the old philosophy, had undertaken an open offensive against scholars whose findings conflicted with the old world view, e.g., Bruno was burnt and Galileo was tried, condemned, and forced to renounce his work (Bernal, 1971).

More than any other seventeenth century scholar, Rene Descartes (1596-1650), a Frenchman, made the Western non-Protestant Christian world safe for scientists and the scientific enterprise. Descartes' primary objectives were to set down an alternate system of knowledge and to survive, physically and intellectually, any and all attacks from the Church (Bernal, 1971). What was, and remains, so remarkably elegant and ingenious about Descartes' approach is that he took his human doubt and turned it to advantage. Layer by layer, Descartes isolated, examined, and eventually rejected as false the different types of ideas or knowledge. In the end, what could not be doubted was the doubt itself (cogito
ergo sum). What was so radical about Descartes' method of inquiry was that the individual human being was the departure-point. The essence of Descartes' approach was that the individual, through human reason, should question and doubt everything. Such an orientation was a direct contradiction to the old philosophic position that human reason is limited but capable of perceiving truth through divine revelation. The conceptualization of the individual human being as actor, initiator, and doer, in contradistinction to the individual human being as receiver of God's grace, responder to God's commands, and acceptor of God's will, had entered into the arenas of philosophical debate and theorizing.

As Descartes' view of the individual human being was a radical shift, so, too, was his conceptualization of the universe. Bernal (1971) contends that Descartes' perspective of the world contained within it a truly revolutionary compromise which was the first articulation of a modern conceptualization of the universe. This orientation consisted of a physical realm and a moral realm which were separate realms with distinct qualities. Physical realities, the measurable, mechanical, and observable, Descartes argued, were the concern of the new science. Descartes was content to leave the moral sphere to the religious establishment, but not until he had demonstrated that his alternate system could prove the existence of God as well as the old system
In essence, Descartes' revolutionary method of inquiry released human beings from the restrictive bonds of divinely revealed truth and directed man to reason as the way to grasp substantial truths about the world. A firm philosophical foundation and justification for the new knowledge had been established (Bernal, 1971; Brinton, et al., 1960a; Lund, et al., 1971).

Although much of what Descartes wrote has been challenged, rejected, revised, and/or neglected, his contributions to the new knowledge, and to the world, include the following three seminal notions: (1) a new method of thinking (universal and methodical doubt); (2) trust in human reason; and (3) the separation of the universe into two spheres. As for the relationship between these two spheres, Descartes had to rest on the supposition that there was some mysterious interaction between them (Lund, et al., 1971). Descartes argued that the physical domain was the sphere in which the new knowledge should concern itself (Bernal, 1971; Durant and Durant, 1961). This concentration on physical phenomena led Descartes to devise a completely mechanistic interpretation of all life. Taken together, Descartes' ideas served as a primary source for the formulation of a new philosophical tradition termed rationalism (Williams, 1967).

Simultaneous with the development of Descartes' approach to knowledge, Francis Bacon, an Englishman, was
setting down his own perspective. Although historians disagree as to whether or not Bacon and Descartes founded separate philosophical traditions, it cannot be denied that both perceived the possibilities of the new knowledge (Bernal, 1971).

Both Descartes and Bacon were especially concerned with method, though their ideas about scientific method differed markedly (Bernal, 1971). Baconian methodology was essentially inductive. Gathering evidence, conducting experiments, and drawing conclusions from the mass of accumulated evidence was the recommended path to knowledge. Descartes' methodology, on the other hand, was deductive, touting reasoned, clear thinking as the path to knowledge. Bacon emphasized the more practical side of the new knowledge, noting that its applicability and usefulness in understanding the world was the just and proper end of science. This idea would become widely accepted in the eighteenth century. As stated above, Descartes emphasized the reasoned construction of an alternate system of the world. Bacon was content to propose an organization to science because he conceptualized the scientific enterprise as a collective search for truths and as a collective builder of new systems (Bernal, 1971).

Francis Bacon's contributions to the new knowledge are no less significant than Descartes'. Bacon forged a new direction for science which was the call for the conquest of nature via organized scientific research (Durant and Durant,
1865), and linked science to the progress of material industry (Bernal, 1971). The concrete practicality of Bacon's organization of science and the elegance of Descartes' alternate system of the world, Bernal (1971) suggests, combined to elevate the status of experimental science to respectability among scholars and the upper strata of the seventeenth century.

Before the seventeenth century came to a close, several other works which dealt with rationalist philosophical issues were published. Two contributions, John Locke's Essay Concerning Human Understanding (1690) and Isaac Newton's Principia (1690), were highly influential in the eighteenth century's modifications, elaborations, and applications of the rationalist philosophical outlook. An English scientist-doctor-philosopher, John Locke rejected Descartes' notion of innate ideas, a class of ideas which are etched on the new-born mind, not by the senses or experience, but by God (Brinton, et al., 1960b). Cartesian innate ideas may be thought of as roughly analogous to what is now called intuition (Bernal, 1971). Rather, Locke suggested that the new-born mind is a tabula rasa (blank slate). Understanding and knowledge, Locke argued, come from experience. The senses and experience "write" on reason and reason then orders the seeming chaos into units representing a true picture of external reality (Lund, et al., 1971). The reader should note that Locke's ideas about the
power of reason in human understanding parallel the inductive methodology set forth by a fellow Englishman, Francis Bacon. In addition, Locke's schema went one step further than did Descartes' in removing supernatural intervention from the affairs of men (Bernal, 1971). Locke's revision of Descartes' conceptualization of human reason as well as his belief in the power of reason were two important perspectives that would "take hold" in the eighteenth century.

The importance of Isaac Newton's *Principia* (1690), another landmark in science and philosophy, cannot be overemphasized because its influence was felt not only in mathematics, astronomy, philosophy, and physics, but spilled over into other such fields as music, economics, politics, history, and social theory (Durant and Durant, 1965). Utilizing a method of experimentation and calculation, Newton, in his *Principia*, substituted a "grand mechanical world machine" world-picture, a dynamic view of the universe, for the ancient Ptolemaic-Aristotelian world picture, a static view of the universe, thereby completing the transformation initiated by Copernicus (Bernal, 1971; Brinton, et al., 1960a). Bernal (1971) states that

"Newton's world-picture was . . . that of a mechanism operating according to a simple natural law, gravitation, requiring no continuous application of force, and only needing divine intervention to create it and set it in motion (Bernal, 1971:487)."
Two points are important here. Bernal (1971) argues that
the divine intervention loophole represents a tremendous
concession by the religious establishment of Newton's day in
that it radically altered the conceptualization of God to a
general creator and organizer, greatly circumscribing God's
heretofore omnipotence and omnipresence. The second point
is that Newton's discovery of a simple natural law regu-
lating the universe and the reliability of his method
fostered the ever-widening search among both scientists and
non-scientists for comparable natural laws governing and
making sense of all phases of life (Bernal, 1971; Brinton,
et al., 1960b; Durant and Durant, 1965).

Without doubt the sixteenth and seventeenth centuries
in Western Europe were times of tumult and phenomenal change
in religion, science, and philosophy. Indeed, the hereto-
fore relatively undifferentiated approach to study of the
world became more compartmentalized with the lines among the
different sectors becoming progressively inviolate as the
seventeenth century neared its end. There seems to be a
consensus among historians and philosophers that Western man
entered a new era during these two centuries. A new age was
born and began to grow. The philosophical underpinnings of
a high-scale society were laid (Arendt, 1977; Brinton, et
Wilson and Wilson, 1945).
Descartes' logic, nearly demolishing Medieval-based Scholasticism, set down a new way of viewing the world through human reason and experience. Rather than relying upon nonrational, spiritual, and supernatural means to gain insights into truth, human beings were offered a new avenue of knowledge. John Locke's revision of the Cartesian conceptualization of human reason completely severed individual man's link with a divinity in matters of knowledge of the physical world. Finally, Isaac Newton, in his Principia, introduced and demonstrated the concept of simple natural law which is a discoverable regularity governing existence. The importance of this particular facet of Newton's work is that it reliably demonstrated to the satisfaction of scientists and non-scientists that simple physical laws govern the universe. These natural laws provided another refutation of the old conceptualization of supernatural governance and interference in the universe (Bernal, 1971; Mill, 1958).

Within the Christian Church, during the sixteenth and seventeenth centuries, altered views of the individual man emerged and opened conflict about the proper view of the man/God relationship. Protestant Christian doctrine began to sharpen its focus on the individual human being's soul in a relationship with God. One might conceptualize the relationship as follows: a willful human being through a willed act of faith comes to spiritual enlightenment. More
and more responsibility for the spiritual well-being of
one's own soul was given to the individual, thus loosening
the bonds of the spiritual community on the individual.

Within the Catholic Church, itself, changes were occurring.
By the end of the seventeenth century a truce, of sorts, had
been called between the Catholic Church and the emerging
scientific community. Each had its distinct and separate
sphere of the universe in which to work.

The Development of a New Belief System

During the seventeenth century a coherent, reliable
method of inquiry, utilizing experimentation, measurement,
and calculation, that is, a disciplined, rational mode of
explanation, was set down (Bernal, 1971). Isaac Newton's
Principia is often cited as the magnum opus of the new
scientific model (Bernal, 1971; Mill, 1958). The successes
of this early scientific method were legion, characterized
by a phenomenal, rapidly accelerating accumulation of disco-
very and knowledge. In addition to this rapid growth of
knowledge, there were technological advances, certainly fan-
tastic by any standards, made by the end of the seventeenth
century via the application of the method and findings of
science in the industrial (mining, metalworking, textiles)
and the agricultural sectors (Bernal, 1971; Brinton, et al.,
1960b). One could not overlook the steady increase in man's
command over the material (physical) world via the new
knowledge. This orientation was encouraged by the Protestant Christian mandate for individual man to strive to improve not only himself but the earth as well, and by the Protestant Christian concept of life on earth as being a never-ending task (Lund, et al., 1971; Weber, 1958).

During the sixteenth and seventeenth centuries, rapid change and growth in science and in its technical application in the material world, evidencing steady improvement in man's existence, gave rise to the notion of progress as it is now conceptualized (Arendt, 1977). Bernal (1971) is careful to note, however, that this notion of progress was confined largely to the seventeenth century's scientific-intellectual community, to precious few from the upper strata of the nonscientific community, and to workers whose lives were touched by the application of science in the industrial or agricultural sectors. With the new knowledge, the new method, and the new belief that individual man must seize the initiative and constantly work hard to achieve goal after goal rather than allow his fate to be determined by supernatural intervention, orchestration, or whim, the possibility of happiness for man on this earth became feasible by the end of the seventeenth century.

The belief in natural laws governing the universe and the belief in the power of human reason combined to provide the cornerstone for eighteenth century Enlightenment rationalism (Brinton, et al., 1960b). Such an orientation
advocated a particular pattern of action toward social change, i.e., planned intervention directed towards establishing greater happiness on earth by providing a firm foundation for a free and harmonious social order based on natural laws (Williams, 1967). Science and its associated method were perceived as providing the tools for building this new social order. It was believed that since method had worked so impressively in solving problems in the industrial and the agricultural sectors, surely the application of method in the social, political, and cultural sectors should also work, especially if the same method was utilized.

Although the phenomenal growth and change slowed somewhat during the first half of the eighteenth century, the technological and scientific advances made in the latter part of the seventeenth century served to further strengthen the foothold of natural law, human reason, and progress (Brinton, et al., 1960b). As practical application of scientific knowledge continued to alter agriculture and industry, the role and place of the individual engaged in agricultural or industrial work began to change. Clearly a phenomenal change in the nature of the relationship between man and the material world was beginning to occur. The place of individual man in relation to creations of his own reason, to machines, to technology, indeed to the means and ends of mechanized production began to receive systematic
attention from Western scholars. Several of the resulting theoretical orientations can be subsumed under the aegis of rationalism.

**Rationalism as the Root of Contemporary Social Thought**

For the purposes of this research three major theoretical orientations toward growth and development are investigated: industrialism from economics, social scale from anthropology and sociology, and technique from mid-1960's French social philosophy, political science, and sociology. By tracing the major emphases of these three theoretical perspectives, the philosophical roots of development strategies as well as the guiding principles of development will be outlined. The similarities among the three theoretical orientations and how they relate to the dominant development ideology, i.e., the growth ethos, will be explored.

Central to the three perspectives is the thesis that although man's adaptation to his bio-physical environment is an enduring fact of history, there has been a qualitative and quantitative shift in man's relationship to his environment. The physical environment began to be viewed as something to be manipulated for man's practical use, pleasure, and/or comfort. And through the application of scientific principles, themselves products of man's reason
and tools for man's use, the number of inventions and new methods began to increase rapidly.

Technique

In *The Technological Society* (1964), Jacques Ellul argues that a new ideology, indeed, a new civilization with the application of scientific principles at a central position of importance, began to emerge in the mid-eighteenth century in Western Europe. The cornerstone concept in Ellul's theory of cultural and societal change is technique, defined at its most basic level as systematic procedures for accomplishing complex tasks. Ellul suggests that as technique began to undergo a radical transformation, so, too, did these technical changes reverberate in all sectors of Western culture: social, economic, and political.

An especially important factor in this change, according to Ellul, was European man's altered view of the material environment. Not only was the utilitarian, pragmatic philosophy dovetailing with the newly developing scientific methodology, but even more important in Ellul's opinion, was the radical shift brought about in human attitudes. A new optimism began to develop in the European consciousness, one where happiness and justice were increasingly linked to the new scientific enterprise. More specifically, the applications of this new scientific method were seen as leading inevitably and inexorably to a better
life for all. Ellul suggests that this new ideological orientation, which he calls "the myth of progress" (Ellul, 1964:47), began to take root by the middle of the eighteenth century. Implementation of this new ideology, as well as the full flowering into a guiding principle of Western civilization, occurred in the nineteenth century.

The emergence of an atmosphere favorable to technical development, however, was not enough, in itself, to signal what Ellul labels a "transformation of civilization" (Ellul, 1964:47). Rather, this transformation . . . can be explained by the conjunction in time of five phenomena: the fruition of a long technical experience; population expansion; the suitability of the economic environment; the plasticity of the social milieu; the appearance of a clear technical intention (Ellul, 1964:47).

Ellul is careful to note that several of these factors existed prior to the mid-eighteenth century. What is unique to the eighteenth century is that they come together in time and place. In the orientation Ellul develops it is the simultaneous coming together of these five factors that explains the exceptional growth of technique (Ellul, 1964:60).

Ellul has developed a conceptual framework for viewing the modern technical phenomenon. The key concept in Ellul's work, as stated above, is technique, defined as "the totality of methods rationally arrived at and having absolute efficiency (for a given stage of development) in
every field of human activity" (Ellul, 1964:xxv). At the outset, Ellul states, and subsequently demonstrates, that contemporary technique has no commonality with technique of the past (Ellul, 1964:61-147). Modern technique, in addition, is divorced from any particular ideological system, e.g., capitalism, communism, or socialism. Neither is modern technique limited to a particular developmental stage in society. It has extended into all sectors and subsumes all activities. Modern technique "has led to a multiplication of means without limit" (Ellul, 1964:78). This seemingly limitless proliferation of means has, in turn, led to a faith in things technological, to a belief that there is no limit to growth, i.e., a growth orientation.

The characteristics of modern technique, as conceptualized by Ellul, are more encompassing than the regularly cited rationality, "exemplified in systematization, division of labor, creation of standards, production norms" (Ellul, 1964:79), and so on, and artificiality, exemplified in the creation of man-made systems of organization and production. A third characteristic is automatism, a process in which the technical phenomenon becomes self-directing. Technique does not allow choice, per se, because it has built within it its own selection criterion, i.e., the only "choice" is the mechanism, method, and organization offering maximum efficiency. This "choice" is made automatically. In addition,
technique "automatically eliminates every nontechnical activity or transforms it into technical activity" (Ellul, 1964:83).

The fourth characteristic of modern technique Ellul lists is self-augmentation. "There is an automatic growth (that is, growth which is not calculated, desired, or chosen) of everything which concerns technique" (Ellul, 1964:87). This growth of technique, equated with technical progress, tends to have a geometric, as opposed to an arithmetic, progression. Not only is technical progress viewed as inevitable, it has come to be embraced enthusiastically by modern men because they are convinced of its superiority in solving problems, in accomplishing goals, in augmenting growth and progress. Finally, in his discussion of the self-augmentation process, Ellul notes that technique is its own solution to its own problems. "It is the only locus where form and being are identical" (Ellul, 1964:94).

A fifth characteristic of technique is monism. Simply put, attempts to make distinctions between/among elements of techniques, i.e., to accept the "good" and reject the "bad," are not possible. The parts of a technical phenomenon "are ontologically tied together; in it, use is inseparable from being" (Ellul, 1964:95). There is but one principle of technique: efficient ordering. One may speak of kinds of technique, e.g., machine, commercial, and so on, but the concept on which all technique is centered is order.
The technical universalism characteristic of technique has both geographic and qualitative aspects. Not only is everything tending to align itself on technical principles, e.g., governments everywhere are advocating industrialization as the ideal, but technique has become the ordering principle of a whole civilization as well (Ellul, 1964: 126). Technique has become the center of society, an event often designated technical civilization.

Technical civilization means that our civilization is constructed by technique (makes a part of civilization only what belongs to technique), for technique (in that everything in this civilization must serve a technical end), and is exclusively technique (in that it excludes whatever is not technique or reduces it to technical form) (Ellul, 1964:128).

The final characteristic of modern technique cited by Ellul is autonomy. By autonomy of technique Ellul means that technique has become its own reality, has its own determinations, tolerates no limitations or judgments from without, does not acknowledge the existence of rules outside itself. "Technique worships nothing, respects nothing. It has a single role: to strip off externals, to bring everything to light, and by rational use to transform everything into means" (Ellul, 1964:142). There is a conviction that technique leads to good and "the good, then, appears as the surpassing of limits" (Ellul, 1969:198).
Industrialism

While Ellul's work concentrates on the nature of what he calls a major shift in the ideational orientation of Western civilization, the industrialism literature focuses attention primarily on changes in the material sphere of man's life and the means whereby these changes are made possible. As does Ellul, the industrialism literature emphasizes that the mid-eighteenth century is the point when marked changes in the ideational and material spheres of Western civilization began to occur.

Industrialism literature typically points to eighteenth century England as the time and place where there developed a new emphasis on taking knowledge gained through observation and experience and applying it for man's use. As discussed above, this new orientation towards knowledge had its roots in the intellectual and religious ferment of the sixteenth and seventeenth centuries. New inventions and techniques involving such components as fuels and power, transportation, communication, and banking and capital all began to center in the English economic sector (Brinton, et al., 1960b; Durant and Durant, 1967; Lund, et al., 1971). There developed within the eighteenth century English scientific fraternity a community of scholars committed to the systematic search for natural laws regulating the growth and development of this vastly transformed economic sector. Deeply rooted in the English tradition, beginning with
Bacon's particular interpretation of rationalism, is the industrialism theoretical perspective outlined below. The central ethos of individual emancipation, the importance of technology, and the perception of growth as a given, desirable condition are main tenets of the industrialism perspective (Brinton, et al., 1960b; Lund, et al., 1971; Whittaker, 1940).

At the most general level industrialism is defined as a distinct stage or form of economic and social organization in which industries, especially large-scale industries, are dominant. A more specialized definition of industrialism, offered by Du Pre Lumpkin, focuses on industrialism as "the stage of advanced technological development by means of applied science" (Fairchild, et al., 1976:155).

Regardless of specificity or generality of definition, however, industrialism is commonly conceptualized as a distinct stage in the development of man's relationship to his bio-physical environment. In addition, this stage of development typically involves a particular organizational configuration centered around the functions of production, distribution, and consumption of commodities, i.e., the industrial enterprise. And, explicitly or implicitly, the application of scientific-rational knowledge is emphasized as a means whereby this distinct stage of development is attained. Characteristics of the industrialism stage of development typically include large-scale production by
means of power-driven machinery, a specialized work force characterized by an elaborate division of labor, highly developed communication and transportation systems, rapid paced urbanization, and large market areas (Fairchild, et al., 1976:155).

Undergirding the various facets of the industrialism model is the interrelationship of two key constructs: size and organization. Size is typically measured in numbers of people (labor), machines (technology), and products (commodities). Organization, or the arrangement of elements with varied functions into a functioning whole unit, is typically discussed in relation to size. Particular attention, then, is given to the amount of and organization of natural resources, labor, and technology, three key variables in the industrialism model. It is posited in the industrialism literature that organizational configuration alters or changes as a function of size or extent of technology, natural resources, and/or labor. In the industrialism model, characteristic ramifications of size with regard to organization of the industrial production sector include differentiation, specialization, rationalized administration, sectoral interdependence, and technology and mechanization (Bell, 1973; Brinton, et al., 1960b; Durant and Durant, 1967; Kerr, et al., 1964; Louis, 1971; Moore, 1963; Toynbee, 1957; Whittaker, 1940).
The material sphere, then, was one of the first sectors of man's life where tangible results and systematic application of the rationalist-empiricist knowledge system were in evidence. The marked change was achieved largely through manipulation of natural resources and discovery and application of physical laws of nature. Expansion (growth) in the industrial production (economic) sphere of man's existence and the concomitant organizational change became increasingly central to Western man's way of life. Contraction of economic activities came to be problematic in that man's livelihood had come to be more dependent on the large-scale, increasingly complex world described in the industrialism literature. In addition to economic contraction, the absence of an industrialized economic sector in a society or community within a society had come to be defined as problematic and viewed as undesirable. The reason for this was that industrialism was seen to produce good, desirable things. These things made life, generally speaking, easier and more enjoyable. People's orientations had begun to shift from the spiritual towards more materialistic considerations, in part, because of the plethora of new material objects offering ease, comfort, enjoyment, a more prosperous existence, and, at a most basic level, livelihood itself.

Increasingly, questions for research and theoretical development concerned the identification of factors involved
in the process of becoming industrial (Kerr, et al., 1964; Moore, 1963; Smelser, 1963), setting down patterns of movement towards industrialism (Brinton, et al., 1960b; Kerr, et al., 1964), investigation of particular communities or societies or particular facets of the social structure and the industrialization process (Hansen, 1974; Hoselitz, 1963; Treiman, 1970), and, in recent years, studies of the impact of industrialization as a development strategy (Nash, 1973; Pratt, 1973; Scott, 1973; Scott and Summers, 1974; Summers, et al., 1976; Tweeten, 1974). The purpose of all this research and theorizing was, and still is, to advance industrial development.

If one could reduce the industrialization literature to its most common concern, it would likely be the question of means, method, technique, "the how" of industrialism. Increasingly the emphasis has been on the need for planning, engineering, coordination, specialization, and efficiency. In many ways the so-called "end-state" is no longer a fixed entity but a process of becoming, the method. This implies that the process of becoming industrial will become more finely honed, i.e., the central focus of research and theorizing has been, is, and likely will continue to be, devoted to the means, the method, the process of becoming industrial. And, for those societies which are already industrial, there will be more extensive efforts to advance the state of industrialism beyond its present stage.
Regardless of ideological orientation the emphasis will be on method, means, technique (Bell, 1973; Brzezinski, 1970; Burnham, 1960; Ellul, 1964; Richta, 1968).

Social Scale

As outlined above, the methodological approaches used by scientists to discover natural laws governing the functioning of the industrialized economic sector began to yield tangible results in both theory and practice, especially in increasing predictability, efficiency, and control.

Fascination with method, as Ellul (1964) details in his works on technique, began to reverberate into other segments of society. Interest began to focus on discerning patterns of industrial development within societies. One early-asked question addressed patterns of change within societies as they moved from one economic organizational type to another, underscoring not only the increasing importance of the economic sector in Western man's life, but also the belief that sectors of a given society are interrelated. Theorizing and research concerning this societal change pattern include classic works by such luminaries in the sociological field as Comte, LePlay, St. Simon, Tonnies, Marx, Durkheim, and Weber. These early works were primarily comparative in nature. In their sociological comparative tradition the focus was on changes in social forms.

The comparative framework moved gradually from dichotomy to continuum to scale. The dichotomy framework
typically delineated ideal types and societies were divided according to an "either/or," "yes/no" criterion. The continuum framework retained elements of the ideal type approach but the "either/or" criterion, for the most part, was abandoned. Rather, efforts were directed towards discerning uninterrupted, ordered sequences of social change. There was greater effort devoted to defining clearly identifiable concepts and to measurement of variance and change in social forms. Underlying the continuum theoretical framework was the assumption that there is an uninterrupted, ordered sequence of change as societies moved from one type of social form to another.

But "real life" did not "fit" either the dichotomy or continuum social change models, so attempts were made to devise a more relational, less lock-stepped schema for measuring, explaining, and of increasing importance, predicting and controlling change. There was a gradual deemphasis on defining fixed steps of societal development. Theorizing about and measuring relationships among a wide variety of factors of social change gained importance. Matters of degree of relationship or variance received increased attention. And, there was increased commitment to make the new science of society more objective, especially with regard to its theorizing about non-Western societies.

One particularly seminal theoretical orientation to develop in this comparative framework was the scalar model.
The term "social scale" and the initial development of the social scale theoretical model are attributed to Godfrey and Monica Wilson (1945). "The central construct of this model is scale, which refers to a social system characterized by a high level of technological expertise and extensive use of sophisticated mechanical equipment for production" (Napier, 1973:3).

Two of the basic standards of scale developed by the Wilsons included the relative size of groups with social relations and the intensity of these relations (Wilson and Wilson, 1945:25). Intensity of relations was to be measured in terms of the degree to which cooperation and communication were concentrated, both currently and historically, in a given society. The Wilsons' emphasis on comparing societies in terms of degree of magnitude, as mentioned above, marked a departure from the dichotomization models of societies and social change. Rather than concentrating on finely tuning a typological tool, they moved towards developing an analytical tool in their scalar model of society.

Using their standards of scale in an analysis of social change in Central Africa the Wilsons suggested that there are, indeed, necessary connections in social relations. They observed that correlates of scale include "complexity, control of the material environment and non-magicality, and impersonality and mobility" (Wilson and Wilson, 1945:100).
With an increase in scale comes increased complexity, i.e., the size of groups in social relations increases and the degree to which cooperation and communication are concentrated increases. There is an increase in the division of labor, greater specialization, and greater attempts to "fit" the increased diversities into complementary configurations (Wilson and Wilson, 1945:101). With an increase in scale there is a concomitant increase in the impersonality of relations. The range of these increasingly impersonal relations, however, increases via transportation and communication. Greater control of the material environment develops. The Wilsons noted that the "control of the material environment in its turn makes largeness of scale possible" (Wilson and Wilson, 1945:101). There is a marked shift from magical to scientific-rational explanation and prediction of events in the physical sector of life, reinforcing and extending this control of the material environment. This material sector, the technological and scientific, the Wilsons emphasized, takes on greater importance with increases in scale. This growing importance of the technological and its connections with the scientific is attributable to the fact that it is seen as a means to goal accomplishment.

It is this emphasis on technology that makes the Wilsons' work pivotal in the social change literature. They enlarged the conceptualization of technology to include not
only machines and arrangement of machines but to include methods and means as well. The Wilsons also expanded the concept of technology beyond the confines of production economic considerations to other segments of society as well. Efficiency, coordination, organization, control, planning, and specialization, to cite only a few key indicators, gained importance in all aspects of social relations (material, structural, and religious) with increases in scale. Technology, then, in the larger sense set down by the Wilsons, is highly intercorrelated with each of the correlates of high scale. It must be noted, however, that the Wilsons' theoretical orientation cannot be labelled technological determinism. Throughout their work they stress the importance of viewing all aspects of change and the interrelationships among the many elements. Primary changes, or increases in the material sector, generally proceed faster than secondary, or social adjustments, but the material changes are not more important.

Since the initial development of the scalar model by Wilson and Wilson (1945) there have been numerous applications and elaborations of the scale construct. Societal scale is the key construct in the Shevky theory of social area analysis (Shevky and Bell, 1955). "In the Shevky-Bell model increasing societal scale is synonymous with the emergence of urban-industrial society" (Timms, 1971:127). Changes in scale, according to the social area analysis
model, are a function of changes in the production sector which accompany the application of industrial technology. Because it posits a linear relationship between economic and social structural changes, the Shevky-Bell model is categorized as an economic deterministic model.

In his revision of the social area analysis model McElrath (1968) departed from the economic determinism of the Shevky-Bell version. McElrath centered on the concept of social differentiation as the key indicant of scale. Because of this focus on the social differentiation process as central, McElrath's conceptualization of scale was less restrictive. Changes in the scale of a society in McElrath's version of social area analysis theory are accompanied by changes in the dimensions of social differentiation (McElrath, 1968:33). Changes in other than the economic organizational configuration were considered. In addition, all changes in social organization were not linearly related to economic structural changes.

Greer (1962), in his elaboration of the scalar model, centered on the concept of interdependency. "As a social system becomes more complex (increases in scale), the components of the social system become more interdependent" (Napier, 1973:3). Greer cites technological advances as the means whereby these high scale interdependences are facilitated.
Regardless of particular differences in the societal scale literature, however, common elements may be discerned. These commonalities include the emphasis on growth (increases in size), concerns with control, organization, and efficiency, and the general consensus that this striving of man to control the physical environment with means and methods of his own creation, indeed, marks the pivotal factor in change to high scale society.

Basic Tenets of the New Belief System as Summarized in the Industrialism, Social Scale, and Technique Literatures

Each of the three theoretical orientations selected for review, industrialism, social scale, and technique, centers on the mid-eighteenth century as the point when the guiding principle characterizing Western civilization began to undergo marked change. Each of the three perspectives emphasizes that man's relationship to the material world is the pivot for this change, though each stresses a different facet of this change. The industrialism literature focuses primarily on the economic sector, social scale literature emphasizes the social organizational, and the technique materials place emphasis on the dynamics of the ideological and practical change. While each focuses on different phenomena, they share several central themes. The first theme shared is that human beings have changed their role extensively in the natural environment. Human beings came to be viewed as the actors, not the responders, as initiators, not
passive recipients, as boldly creative and inquisitive, not acquiescent. In tandem with this new view of human beings and their roles in the world, there developed a new view of the world, a more concrete perspective, "this world, here-and-now" view. Increasingly the physical environment, i.e., nature, was seen as something to be manipulated, controlled, and/or molded to fit man's designs and demands. Nature, up to this time, had generally been viewed as a mysteriously powerful force in man's life. But as nature began to yield its secrets to the application of the new creation of man's reason, the disciplined system of inquiry known now as the scientific method, man's relationship to the material world began to shift. Francis Bacon's early assertion that knowledge is power gained credibility as the results of systematic inquiry were applied to the industrial sector. The linkage of science to the progress of material industry, initially forged by Bacon, became a central fixture in this new Western ethos. And, the driving force, the means whereby this material progress was achieved, was increasingly technology, i.e., the application of science to commercial and industrial production.

Technology, per se, was by no means a new phenomenon to mid-eighteenth century Western Europe. What was new was its link to the discipline of scientific inquiry and to knowledge, in general. Each theoretical perspective reviewed above stresses that the result of this linkage of
technology, science, and knowledge was a new direction of thinking. Major questions asked relative to science's findings and technology began to center on the problems of utility, applicability, implementation, and results. Of major importance was the creation, design, implementation, maintenance, and fine-tuning, i.e., improvement, of increasingly artificial, man-made systems. And, as these applications of science to commercial, industrial, and social organization, began to yield improved circumstances, usually quantitative and/or qualitative in nature, in the material sphere, technology began to acquire more value. It was increasingly associated with progress in the material sphere. Technology was seen as the means to a better life for all, i.e., life in a high scale society. Each of the theoretical orientations reviewed above argues that complex or high scale societies are only possible when a highly developed technology is present within the society and applicable to the economic-production sector. Technology in each of the theories is legitimated, accepted, and expected. It is perceived as the driving force, the means to a better life in high scale societies.

It is suggested in this research that human beings are committed to a technology-driven growth ethos. This growth ethos is a particular mode of thought firmly rooted in the rationalist view of man's condition. Further, it is suggested that this growth ethos fosters the valuing of a
particular pattern of growth and a particular conceptualization of progress. Concern for the physical and material well-being of man, i.e., the materialist context, is suggested as a primary concern and has served as a "filter" of sorts, in the development of the values subsumed in this research under the heading, "growth ethos." A commitment to technology is the mechanism, the means whereby this particular pattern of growth and progress has reached its zenith.

The focus of this research is on attitudes towards technology. The specific emphasis is on attitudes towards the introduction of more complex technologies in industries and our lives in general.

The theoretical perspective used in this research is an application of utilitarianism to perceptions of technology. The reason for selecting this particular approach is that the utilitarian theme permeates the industrialism, societal scale, and technique literatures. In addition, the theoretical construct, utilitarianism, provides a context for discussing the other major cross-disciplinary constructs within these literatures, i.e., pragmatism and materialism. Indeed, it might be argued that these three constructs form the core of the rationalist zeitgeist described in the literatures reviewed.

Basic notions of utilitarianism include valuing the useful as good or worthwhile, making usefulness the criterion
for action, and stressing the value of the practical over other qualities, such as aesthetics. The ethical doctrine of utilitarianism, as proposed by Jeremy Bentham and revised by John Stuart Mill, emphasizes that all social, moral, and political action should be directed towards achieving "the greatest possible happiness for the greatest possible number of people" (Lund, et al., 1971:227). At the individual level, Bentham proposes that the individual's self-interest is dictated by nature and by reason. To maximize happiness and to avoid pain, Bentham states, is at the core of the individual's self-interest. "The more everyone is able to work for his own happiness and in his own interest, the more benefit there will be to society as a whole; its sum total of happiness, its accrued happiness will increase accordingly" (Lund, et al., 1971:228).

Given this utilitarian framework the evaluation of objects and/or ideas began to pass through an increasingly formalized utilitarian filter. The criteria for evaluating the benefit(s) that objects and/or ideas might bring to society as a whole or to the individual human being's own self-interest within this utilitarian framework included usefulness, applicability, and practicality. These standards were increasingly applied to the material and non-material aspects, regardless of whether the potential user was an individual, a factory, an industrial complex, or an entire society. Within this utilitarian context, technology
acquired tremendous importance in that it was linked to the developing industrial, large-scale societal growth pattern. The benefits, usefulness, applicability, and practicality of technology for individuals as well as for entire societies were in early evidence and proliferated at rapid rates. As Nisbet (1966) notes, there developed a utilitarian devotion to technique.

**Sociological Theory and Utilitarianism**

Among the major sociological theoretical orientations, social exchange theory has probably drawn most heavily from basic utilitarian assumptions and concepts, albeit via the behaviorist psychology and social anthropology traditions (Turner, 1974:213). Because of this utilitarian link, the basic utilitarian tenets and assumptions as well as the lexicon of social exchange theory will be used for hypothesis formulation. A lengthy discussion of the behaviorist and structuralist variants of social exchange theory, however, will not be developed in this research. Rather, the focus will be on the utilitarian components of the theory.

Both Turner (1974) and Mulkay (1971) emphasize that social exchange theorists have reformulated some basic utilitarian principles. The revisions were based on the recognition that: (1) Individuals rarely seek to maximize profits; (2) Individuals are not always rational; (3)
Transactions between/among individuals are rarely without external regulation and/or constraint; and (4) Complete information on any situation is rare (Turner, 1974:212). Alternative utilitarian assumptions in the social exchange perspective include: (1) Some profit is sought by individuals in their social transactions with others; (2) Individuals assess costs and benefits in social transactions; (3) Individuals are usually aware of at least some alternative situations and assess the costs and benefits of these alternatives, making decisions based on these evaluations; (4) Individuals compete with each other to make a profit in their transactions; and (5) Benefits and costs can be either material or nonmaterial (Turner, 1974:212-223).

The most explicit and comprehensive lexicon of key social exchange theoretical concepts comes from the exchange behaviorist perspective formulated by George C. Homans (Turner, 1974:266). Homans' lexicon may be divided into major conceptual portions, including descriptive terms, variables, psychological factors, and elementary economic factors. The descriptive terms used to categorize the various types of externally observable behaviors include activity which is further subdivided into specific subtypes termed sentiments, interaction, and norms. These descriptive terms are defined below.
Activity includes behaviors emitted to derive rewards. Peter M. Blau, the major exchange structuralist theorist, adds that behaviors are emitted to avoid deprivation as well as to derive rewards (Mulkay, 1971:183; Turner, 1974:235).

Sentiments are "activities in which individuals communicate their 'internal dispositions' such as liking-dislike or approval-disapproval of each other" (Turner, 1974:235). Sentiments are "not inferred from overt behaviour, they are overt behaviour and so are directly observable" (Mulkay, 1971:152).

Interaction refers to activity or behavior that is social in nature, i.e., it is behavior "in which people direct their activities in order to derive rewards, and avoid punishments, from each other" (Turner, 1974:235). The term interaction is used when particularizing and categorizing the type of emitted behavior as an activity or sentiment or whatever, is not of primary concern (Mulkay, 1971:152).

Norms are "verbal statements—a type of activity—in which people communicate the kinds of activities that should, or should not occur, in a situation" (Turner, 1974:235). Norms are not necessarily consensual (Mulkay, 1971:152).

The two major theoretical constructs in Homans' social exchange perspective are value and quantity. These
constructs "express some of the dimensions along which descriptive terms can vary" (Mulkay, 1971:152).

Quantity refers to the number of social activity units emitted per time unit (Mulkay, 1971:152; Turner, 1974:235).

"Value refers to the degree of reinforcement or punishment that a person received from a unit of activity emitted by another person" (Mulkay, 1971:152-153).

As Mulkay (1971) and Turner (1974) note, Homans goes to great lengths to document his debt to Skinnerian or operant psychology. Two psychological factors, deprivations and rewards, are central to Homans' entire theoretical analysis. It is interesting to note that in their conceptualizations of these two psychological factors, Homans, the major behaviorist exchange theorist, and Blau, the major structuralist exchange theorist, differ most markedly.

Deprivation refers to the loss, denial, and/or lack of the basic necessities, and/or lack of the comforts of life. In the behaviorist schema, the concept of deprivation serves as an "operational indicator of the 'reward value' of activities" (Turner, 1974:245). Peter M. Blau's structuralist approach emphasizes that behavior is emitted to avoid deprivation as well as to bring forth rewards. Blau's interpretation greatly expands the applicability of the term "social exchange" to a wider variety of situations (Mulkay, 1971:182).
In the behaviorist interpretation of social exchange, the term *rewards* refers to "anything a person receives, or any activity directed towards him, that is defined by the person as valuable" (Turner, 1974:235). The concept of *rewards* in the structuralist perspective has a more complex coloration because it has both positive and negative connotations (Mulkay, 1971:182-183). This complexity stems from the observation that behavior can be emitted to avoid deprivation as well as to bring forth rewards.

Turner (1974) makes the observation that the concept of rewards in social exchange theory is simply a way of restating the concept of utility from the utilitarian exchange tradition. Briefly, utility refers to anything having the quality or condition of being useful. The concept of rewards from the behavioral psychology tradition has been substituted for utility "because it allows exchange theorists to view behavior as motivated by psychological needs" (Turner, 1974:222). Another way to view this is that the behaviorist conception of rewards extends the utility concept beyond the useful, material realm. In addition, it expands the qualities of value to other than solely usefulness.

The remaining major concepts in the social exchange lexicon are largely restatements of elementary economic factors, including *cost, investments, and profit.*
Cost refers to an unpleasantness or negative reward incurred in the course of obtaining a reward and also to "positive value attached to alternative courses of action which are forsaken and which thereby reduce the net reward attained" (Mulkay, 1971:153).

Investments are defined as qualities an individual brings to an action situation which influence the distribution of costs and benefits. Investments are evaluated both by the person who possesses them and by persons with whom he is interacting. Examples of investments are social characteristics, e.g., age, sex, and race, and relevant past activities, e.g., education, wealth, skills, and expertise (Turner, 1974:235).

Profit is defined as reward(s) minus the cost(s) and investment(s) for engaging in a given activity (Turner, 1974:236).

The behaviorist and structuralist exchange perspectives differ in the definition of exchange. "For Blau, exchange occurs only among those relationships in which rewards are expected and received from designated others" (Turner, 1974:266). Homans, on the other hand, defines exchange as encompassing an activity, regardless of whether rewards are expected or received. Both Blau and Homans share the recognition, however, that in their focus on exchange activity, they are employing an elementary economic model (Turner, 1974:266). The core idea of the social exchange
model is that people do attempt to achieve some profit from interactions and they will continue to interact with individuals who help them attain their desired ends.

With the exchange concepts above outlined providing the theoretical underpinnings, what follows is a summary of the basic axioms (Homans' word) or principles (Blau's word) of exchange theory. (1) If a particular activity has been rewarded in the past, then the individual will tend to repeat the activity or a similar activity; (2) "The more often within a given time period an individual's activity rewards the activity of another, the more often the other will emit the activity (or a similar activity)" (Turner, 1974:236); (3) The more valuable to an individual the activity another gives him, the more often he will emit activity rewarded by that of the other; (4) The more cost an individual incurs in emitting an activity, the less often he will emit the activity; (5) "The more often an individual has in the recent past received a rewarding activity from another, the less valuable any further unit of that activity becomes to him" (Mulkay, 1971:154); (6) Activities will be repeated only as long as the activities produce valued rewards; (7) When selecting from a range of alternative actions, the individual will select the activity he believes will be the most successful in obtaining rewards.

What these somewhat cumbersome axioms or principles are stating is that individuals tend to engage in activities
that have in the past been rewarded or are perceived to have the potential to be rewarding. There is a qualification, however, stated in principle four. When the reward for an activity has become a frequent occurrence, it will lose its potency as a reward and the individual will begin to emit activities in search of different rewards (Turner, 1974:236). This particular condition is called satiation. Also stated in these axioms is that individuals tend to repeat activities in anticipation of future rewards.

The Convergence of Rationalism and Utilitarianism in Modern Social Exchange Theory

As emphasized throughout the above discussion, modern social exchange theory has a strong utilitarianism legacy. According to Turner, the behaviorist variant of exchange theory is

in many ways . . . an extreme variant of utilitarianism since it operates on the principle that animals and humans are both reward-seeking organisms that pursue alternatives that will yield the most reward and the least punishment (Turner, 1974:221-222).

It must be noted that exchange theorists, whether structuralist or behaviorist in orientation, have generally agreed that rather than seeking to maximize reward in every situation, the human organism seeks to receive some reward from interactive situations. Turner goes on to state that the exchange definition of "reward" is simply a restatement of the utilitarian economist's concept of "utility" (Turner,
The exchange perspective has also retained the economist's notion of "cost" in preference to the behavioral psychologist's notion of "punishment." The "notion of 'cost' allows exchange theorists to visualize more completely the alternative rewards that organisms forego in seeking to achieve a particular end" (Turner, 1974:222). That is, individuals are conceptualized as choice-making organisms, capable of selecting among several alternatives. Herein is an important link to the rationalist view of man's condition. The human organism does not merely seek to avoid pain, but can consciously weigh the alternatives available and affect the outcomes of interactive situations. If several alternatives are presented, the human organism, it is suggested, will not necessarily select the first attractive alternative, but will weigh the costs and rewards of each. The human being is in control, actively seeking rewards that meet his/her needs. Action, it is asserted, is based on knowledgeable choices and decisions, a rational weighing of costs and rewards.

Utilizing the social exchange notions of costs and rewards and applying them to costs and rewards associated with technological solutions, then, certain of the utilitarian based social exchange propositions may be applied to the question of attitude towards technology. For example, it can be argued that people will tend to have more favorable attitudes towards technology if they perceive that
the technological solution will likely be the most successful in obtaining rewards. The technology is viewed as "useful" because it is seen as the most promising means to an end, the solution to a problem. The solution to the problem in this case may be viewed as a reward. In this regard, Schnaiberg (1980) makes the observation that the usefulness of technology has come to be so linked with problem solution that it (technology) is now viewed as the solution to a wide array of problems from production efficiency to health care. Technology has solved, is solving, and will continue to solve problems. As a consequence, the behavioral change alternative as a means to problem solution has not been viewed in as favorable a light. Any behavioral adjustments will be made relative to the "best" solution, the technological one. Technology, Schnaiberg (1980) asserts, has solved many problems without the individual having to embark on major behavioral change. Behavioral change is seldom desired since such change would be defined as a cost.

There are both costs and benefits (rewards) of technological solutions to problems. The benefits and costs, however, are unevenly distributed among individuals in a given locale. Because technology can have different effects on different individuals and social groups, the exchange model, with its utilitarian emphasis, should provide an appropriate approach to the question of how specific factors
affect perceptions of technology. The social exchange concept of "investments," defined as social characteristics and past activities that individuals bring into interactive situations, is one such factor. Within the social exchange framework, investments are important because it is posited that the amount of benefits an individual receives or can expect to receive from any interactive situation partially depends upon his investments. Technology can be rewarding for individuals if their investments are judged as useful and appropriate to technological solutions. How appropriate these investments are to the new situation partially defines the contribution individuals might make and, thus, shapes, to some extent, the benefits or rewards received. If the resources (investments) individuals bring to the situation are appropriate, then these individuals could be said to have high investments. In fact, the more appropriate each individual's skills are relative to the technological solution, the greater the contribution he can make and subsequently, the greater rewards the person can expect. Individuals with more appropriate investments or characteristics will probably benefit more vis-a-vis the technological solution and will be more likely to be supportive of technological solutions. They might also find themselves in positions to bargain for more profit if their investments are deemed especially appropriate to the particular technology. Finally, individuals with high investments
vis-a-vis technology likely will not have to assume more costs to make their investments more applicable, e.g., upgrading skills with special training. Therefore, those individuals with more investments deemed appropriate to technological solution will tend to have more favorable attitudes towards technology as a means of problem solution because they are more likely to attain more benefits (rewards) in a shorter period of time from the exchange situation.

It does not necessarily follow, however, that persons whose investments may not be as appropriate relative to the technological solution will have unfavorable attitudes towards technology. If these persons view technology as the most practical, attractive, and/or efficient means for producing desired results, then they will tend to have more favorable attitudes towards technology. If these persons view technology as being better for society, i.e., if the society as a whole would likely benefit from the technology, these individuals could perceive societal benefit (direct benefit) as benefiting them (indirect benefit). However, being investment-short may mean that they will have to supplement their investments before they can begin to capitalize on the wide range of rewards available. The anticipation of future rewards(s) will tend to encourage and/or maintain the positive attitudes towards technology as the means to desired rewards. As long as those individuals
with fewer investments are able to keep their costs from exceeding their expected benefits (rewards), they will tend to have and maintain favorable attitudes towards technology. And, as long as technology is seen as leading to the receipt of desired rewards, the favorable attitudes will be retained. If, however, no reward is received, anticipated, or no longer anticipated, then attitudes towards technology will tend to be less favorable.

What, then, are some of the rewards to which technology and technological solutions to problems are most often connected? Typically, these rewards include not only jobs, but higher status jobs, higher salaries, more fringe benefits, a higher standard of living, and easier access to a greatly expanded range of goods and services. As may be noted from this listing, rewards commonly viewed as most readily attainable via technology tend to be work-related. In this context, the rewards of technology tend to fall into one of two categories. First, there are those rewards which may be categorized as enabling or equipping people to pursue and attain the additional rewards they desire. Examples of this first category of rewards include the job and the salary or wage. For some individuals, however, the job or salary may be sufficiently rewarding in itself. Second, there are those rewards which may be viewed as ends in themselves, e.g., the "good life." This linkage between technology and work is, however, much deeper and more complex
upon examination. Ellul (1969) makes the observation that in Western societies the work/technology link has gone beyond the practical level to the morality level. According to Ellul (1969), work did not become a virtue, and a cardinal virtue, the father of all virtues, until the bourgeois society of the eighteenth and nineteenth centuries. That is the first time in the history of mankind that work becomes a good, a 'worker' a title of nobility . . . . It was technique which both required and made possible this dedication of man to work. The work which has become the principal virtue in our society is technological work. And the virtues which are elaborated in this morality are all connected with work (Ellul, 1969:195-196).

Viewed in the context Ellul (1969) presents, technology has acquired a multi-faceted value in Western society. It is not only the most practical and appropriate means to an end, but has become an end in itself. That is, with the introduction of technology the particular problem is increasingly looked upon as "solved." In addition, the man/technology link has become more complex in that man has not only legitimated technology but has, in turn, come to use technology to define and legitimate his own worth and value. Ellul (1969) continues with the observation that this technological morality has made virtues of confidence in the future as well as the "all is possible" outlook. This morality of the "gigantic" and the "limitless" has been produced by the "boundlessness of means and of technical success" (Ellul, 1969:197).
Application of the Utilitarian Orientation to Attitude Towards Technology

The utilitarian orientation which is well developed from social philosophy and provides the philosophical underpinnings of social exchange theory will be used to develop specific hypotheses for testing regarding attitude towards technology, the focus of this research. The utilitarian model will be used to show how specific variables should affect perceptions of technology.

Throughout the above discussion of attitudes towards technology the following utilitarian themes can be discerned: (1) That which provides the greatest good for the greatest number of people is valued; (2) The useful and the appropriate are valued as good; and (3) The utility of an idea or object is the criterion for action. Given that technology is generally accepted as a primary means for attaining the rewards of high scale society and that those individuals who have greater quantities of investments appropriate to the technological solutions will be able to use their investments to their greater advantage, they should perceive their favorable position, and therefore, have more favorable attitudes towards technology than those individuals with fewer investments appropriate to the technology. The reason those individuals with more appropriate investments will likely have more favorable attitudes towards technology is that they should be able to capitalize
on their investments and realize profits for themselves vis-a-vis the technological solution. The main hypothesis of this inquiry, then, is that individuals who have more investments deemed appropriate relative to technology will generally have more favorable attitudes towards the technology than those individuals with less appropriate investments. Technology is seen as useful and appropriate on the societal or community level because it is generally viewed as a primary means to high scale societal development which is, in turn, generally viewed as providing a better life for the majority of the society's or community's people. And, for those individuals whose investments are appropriate relative to the new technology, there is the immediate reward of legitimation of one's own worth and value.

At this point it must be emphasized that the perspective advanced below will not attempt to measure costs and benefits, per se, of technology. Rather, the focus will be on how certain individual characteristics should affect the assessment of potential costs and benefits associated with technology. This costs/benefits assessment involves weighing the probability of receiving rewards from technological solutions to problems.

Variables and Hypotheses

Several variables were selected to represent investments which may be applicable to the question of attitudes
towards the introduction of more complex technologies in industries and individuals' lives in general. As defined above, "investments" are qualities an individual brings to a situation, e.g., social characteristics and past experiences. Among the variables representing investments are: age, education, employment status, job satisfaction, length of residence, and occupation. These variables are investments because they are indicative of those relevant social characteristics (age, employment status) and past activities (education, job satisfaction, length of residence, and occupation) that individuals bring into activities relating to the introduction of technology. Those individuals who have more appropriate investments to bring to an exchange situation involving the introduction of more complex technologies have a higher probability of gaining more rewards (benefits) from the introduction of technology. Since these individuals with higher investments are more likely to gain more rewards from the introduction of technology, they will likely perceive that they will secure more benefits for themselves. And because they perceive that the introduction of newer technologies might provide the means whereby they could secure more benefits, they should have more favorable attitudes toward technology. Not only will these individuals be more likely to see their own advantages vis-a-vis technology, but they will be more likely to perceive the
potential of reward(s) via the introduction of technology for their region as well.

Age

Age is an investment variable in that it is indicative of the number of years an individual has already committed to the existing technological order as well as the number of years the individual may have remaining to realize the benefits that the introduction of more complex technologies might bring. Younger persons will tend to have fewer years invested in the existing technological order so they will likely incur fewer costs if technological change is introduced. The introduction of newer technologies into a region will generally offer more opportunities to secure benefits to younger individuals. For example, the new technologies may increase employment opportunities. Summers, et al., (1976), have found that younger persons are more likely to secure employment when industrial development occurs in rural areas. In addition, new technologies may radically alter existing work roles, necessitating the training or retraining of work force members, or at the least, a work force able to adjust rapidly to change. Younger individuals tend to be selected for the requisite special training or retraining because they tend to have less established work patterns, tend to be more readily adaptable to change, and because they have more remaining years of employability;
thus enabling the company to recover its often substantial financial investments in these individuals. The introduction of newer technologies in the workplace, then, tends to work to the advantage of younger individuals, providing the means whereby they can avail themselves of the opportunities for employment, career advancement, increased earning power, greater prestige, and more attractive fringe benefits.

The introduction of technology can also profoundly alter existing social structures. More costs are associated with the introduction of technology for older people because the changes will likely disrupt their established routines. The old ways of doing things, of making things "work" in their communities might be disrupted. Both the formal and informal networks of local organizations and associations may be upended, often affecting long-established behavior patterns. Elderly persons are also more likely to be on fixed and/or limited incomes and the probable cost of living increases that may accompany the introduction of new technologies may adversely affect older persons' life patterns. As Foster (1962) notes, "associated with every technical, material change there is a corresponding change in the attitudes, thoughts, values, beliefs, and behaviors of the people who are affected by material change" (Foster, 1962: 2-3). Not only are the costs of the material changes associated with the introduction of more complex technologies greater for older persons, but the costs of the
subtle, and often more pervasive, non-material changes are higher for them as well. In fact, the non-material changes associated with the technological changes may be more devastatingly costly for older persons. Older individuals' inability or unwillingness to adjust to the material and non-material changes that accompany the introduction of more complex technologies is contrary to what Ellul (1969) has labelled the highest virtue demanded of man today, i.e., adjustment (Ellul, 1969:192). Thus, older persons' costs may be much higher than those of younger individuals. Not only may they not realize any or only minimal material advantage or benefits but their unwillingness or inability to adjust to the changes precipitated by the introduction of technology may be negatively viewed by the population at large which perceives technology as the means to problem solution. Older persons will tend to see the introduction of more complex technologies as disruptive of their comfortable, predictable environments. In fact, older persons may perceive the introduction of more complex technologies as the means to problem creation for them. Age, then, is hypothesized to be negatively associated with perceived benefits from the introduction of more complex technologies as well as negatively associated with favorable attitude towards technology. Because younger persons have more years to invest in securing the benefits that the introduction of
technology might provide and because they have a higher probability of being able to capitalize on the opportunities for achieving benefit that the introduction of more complex technologies provides, they will have more favorable attitudes towards technology. Age will be inversely related to favorable attitudes towards technology.

Employment Status

Employment status is an investment variable in that it is indicative of how much the individual is benefitting from the current technological order as well as of how much the individual might benefit from the introduction of more complex technologies as a means of problem solution. Unemployed individuals should perceive the introduction of more complex technologies as providing the means whereby they might re-enter the work force, thus enabling them to begin to secure benefits from changes in the region's techno-socio-economic configuration. Benefits might take the form of expanded employment opportunities, a wider variety of employment opportunities, and more secure employment. Other direct benefits might include an increased sense of worth as the individual re-enters the work force, the possibility of discovering, developing, and using unrealized skills and talents (resources) as unemployed persons consider the possibly wider range of employment opportunities, and possible opportunities to
apply already developed resources to employment situations previously unavailable in the region. Indirect benefits might come to the unemployed in the form of possible general economic, social, and governmental structural change. In short, the unemployed should perceive significant benefits accruing to them as a result of the introduction of more complex technologies. The expansion of technologies will likely require more workers and because they are unemployed they are immediately available for employment. Unemployed persons, then, will tend to view favorably the introduction of more complex technologies because they should perceive technology as providing the means whereby they can avail themselves of the anticipated direct benefits of employment.

Because the introduction of more complex technologies will likely alter the existing techno-socio-economic order from which employed individuals are securing benefits, those who are employed will probably see some costs from the introduction of technology as a means to problem solution. Possible costs might include a disruption of current living patterns, possible cost of living increases, possible employment disruptions in the form of altered work roles, changed work environments, and/or possible job loss, as well as the costs of having to adjust to a possibly profoundly different techno-socio-economic structure. Because employed persons are already securing some benefits from the current order, they will likely tend to consider both the short- and
long-range costs and benefits that might accrue to them as a result of the introduction of technology as a means to problem solution. Employed persons, then, may perceive the introduction of more complex technologies as tending to involve some costs for them. This does not mean, however, that employed persons will tend to have negative views of technology. Rather, the introduction of more complex technologies will likely present them with more cost/benefit factors to consider as they attempt to maximize their benefits and minimize their costs.

This line of reasoning suggests that employment status will be significantly related to attitudes towards technology. It is hypothesized that unemployed persons will have more favorable attitudes towards technological change than employed people. Unemployed individuals will probably be in a position of relative crisis. They will probably view their need for employment as of primary importance and will likely not be able to afford the luxury of evaluating long-range and/or indirect costs and benefits. The unemployed will likely need the short-range benefit of immediate employment opportunities and will probably view that benefit as the key to long-range and indirect benefits as well. Because the unemployed will tend to view the introduction of technology as providing the means whereby they can begin to secure benefits, they will tend to have more favorable attitudes towards technology.
Employment status will be inversely related to favorable attitudes towards technology.

Length of Residence

Length of residence is an investment variable in that it is indicative of the individual's past experiences in the particular geographic area into which the introduction of technology is proposed as a means of problem solution. Persons who have lived in an area for longer periods of time will tend to have less favorable attitudes towards the introduction of more complex technologies as a means of problem solution because they will likely perceive several of the probable techno-socio-economic changes associated with the introduction of technology as costs. The more years individuals have lived in a particular area, the greater the likelihood that they have made considerable monetary investments in property as well as investments in the local formal and informal associational and organizational networks. The introduction of technology into an area can alter profoundly not only property values, but the demographic, economic, social, governmental, attitudinal, and value systems as well. The interconnectedness of the changes brought about by technological change can radically alter a region. These multi-faceted changes may be more costly for longer-term residents because established routines may be disrupted, possibly making them feel like
"strangers" in "their" home community. Length of residence can also be an indication of the amount of benefits individuals have secured from the region. The longer individuals have remained in a given location, the more likely it is that they have been able to establish and maintain profitable conditions for themselves. Proposals to introduce technological change so that conditions in the area might improve could prompt long-term residents to ask how one could improve on an already good situation. At the least, longer-term residents will likely have listed numerous benefits of the existing order on their "balance sheets" as they consider the question of the introduction of more complex technologies as a means of problem solution. While the introduction of technology in a region may bring some benefits to longer-term residents, e.g., employment opportunities, higher salaries, more services, and so on, it will likely bring an equal or greater number of costs, e.g., higher taxes, increased living costs, possible job losses, stagnation in career movement,1/ new value and attitudinal

1/ "Stagnation in career movement" means that chances for advancement are negligible. Career advancement may not have been available before the introduction of technology because there were few or no opportunities in the given economic structure. The introduction of more complex technology might open some heretofore closed avenues for upward career movement, but these opportunities will not be available for everyone. There is the problem of the person who, even with the new advantages offered by the new technology, has to face that he is at the height of his career mobility.
systems, new demographic configurations, and disrupted social, governmental, and service patterns, and so on. The costs of the introduction of more complex technologies for longer-term residents, then, will tend to be higher than those of short-term residents in both material and non-material aspects. **Length of residence will be inversely related to favorable attitudes towards technology.**

**Occupation**

Occupation is a product of an individual's past investments in the development and application of his work-related skills. How appropriate these investments are to the newer, more complex technologies will determine, to a great extent, the benefits the individual might receive from the introduction of the newer technologies. Among the benefits occupation provides are the means whereby people secure goods and services, i.e., it directly affects access to goods and services. Occupation also provides the means whereby opportunities for upward mobility and for increasing prestige and status can be approached, cultivated, and achieved.

In high scale societies occupations are generally valued and rewarded according to how useful they are to the economic and material growth and progress of the society. The professions and high technology-related occupations in high scale societies are usually viewed as useful to the
economic and material growth and progress of the society. These occupations are thus ranked as high skill occupations and usually carry such benefits as higher salaries, greater prestige, and higher status for their practitioners. Persons in these high skill occupations have usually invested considerable time and money in the development of their work-related skills, i.e., they have already incurred costs in order to receive the benefits that these occupations generally afford their practitioners. These high skill occupations are generally highly involved with technology, most often in the managerial, manipulative, developmental, design, and/or control aspects. Advancement for individuals within these occupational categories is highly dependent on technological growth and progress. Persons who are in these high skill occupational categories, then, will tend to perceive the introduction of more complex technologies as providing the means whereby they might further advance themselves in their careers. Advancement might take the form of greater earning power and expanded job opportunities, as well as increased status and prestige. Other benefits which might accrue to persons in these high skill occupations include more secure employment and potential opportunities for professional growth and development that the introduction of new technologies generally offers.

In addition to these potential benefits, persons in the higher skill occupations and professions will likely be
able to minimize their costs. Because their skills are more likely to be more readily transferable or adaptable to newer, more complex technologies, they will tend to be less likely to incur the costs of displacement which often accompany the introduction of newer, more complex technologies. Individuals in higher skill occupations and professions, then should have more favorable attitudes towards technology because of their higher investment in the development of their high technology-related skills, their relative advantages in securing the benefits of the introduction of newer, more complex technologies, as well as their relative advantages in minimizing their costs vis-a-vis the introduction of newer, more complex technologies. It is hypothesized that occupational status will be positively related to attitudes towards technology.

Education

Education is an investment variable in that is is indicative of the commitment an individual has made to the development of his level of skills by means of formal training. Most often this commitment is measured in terms of time invested in the formal training period(s). The greater the number of years persons have devoted to the acquisition and development of their skills via formal education, the more likely it is that they will be in the
vanguard of technological development and/or adoption. One reason for this is that in high scale societies there has been an increasing reliance upon formal education to lead the way in the development and adoption of new ideas and technology (Foster, 1962; Illych, 1973). The more time individuals have committed to acquiring and developing their skills via formal training, the more likely it is that they will have adopted a positive view of technology. Among the reasons for their positive view of technology would be that the longer they have been in the formal education system, the more likely it is that the knowledge and skills they have acquired will tend to be highly related to technology, most likely including such functions as design, control, and/or manipulation. That is, the skills and knowledge they have acquired via formal training will tend to give them a greater degree of power vis-a-vis technology. Their skills will tend to be generalizable beyond specific technological devices. The more years of education individuals have, the more likely it is that they will tend to perceive technology as providing opportunities for societal as well as for their own personal and professional growth. In addition, it is more likely that persons with more years of formal education will tend to see the introduction of more complex technologies as presenting new challenges in the application, development, and expansion of their knowledge and skills. The new, more complex technologies might also provide new
employment opportunities. The more education individuals have, then, the less likely it is that they will incur the cost of unemployment with the introduction of more complex technologies. While it is true that some re-learning might be required, especially with the possible new employment opportunities, it is highly unlikely that persons with more education will be displaced by new technologies. In addition to direct benefits, highly educated persons will be more likely to perceive and capitalize on the indirect benefits that the introduction of more complex technologies may present, e.g., expanded services and increased secondary economic opportunities. Because more highly educated persons will have a higher probability of being able to secure significant benefits from the introduction of more complex technologies, they will tend to have more favorable attitudes towards technology. **Education will be positively related to attitudes towards technology.**

**Theoretical Synthesis**

The investment variables are hypothesized to have direct effects upon perceived personal benefits of technological change, since the greater one's available investments, the more likely it is that the individual will gain benefits and will, thus, have a more favorable attitude towards the introduction of technology as a means to problem solution. This line of reasoning suggests, then, that younger, unemployed persons who have had more years of
formal education, who are in higher status occupational groups, and who have had a shorter tenure of residence in a particular geographic location, will tend to have more favorable attitudes towards technology. While on the surface employment status does not appear to be consistent with the other investment variables, the exchange notion of "costs" must be recalled. Persons who are employed will likely have more costs to weigh as they consider the opportunities that the introduction of more complex technologies might offer them. For example, employed persons might have to consider the costs of leaving a secure, profitable job for a less secure, but potentially more challenging job, or attempt to balance the costs of a disrupted work routine against the benefits of more variety and challenges in their work. While employed persons may tend to incur more costs this does not mean that they have negative views of technology. Rather, they may have more costs to consider. Unemployed persons, on the other hand, will likely be in a crisis situation and will not be able to indulge in the luxury of a cost/benefit analysis. The unemployed will tend to perceive the possible benefits of securing employment and will consider little else. Individuals with more appropriate investments vis-a-vis technology should have more favorable attitudes towards technology as a means of problem solution because they will anticipate receiving more benefits from the introduction of more complex technologies.
CHAPTER 2
RESEARCH METHODOLOGY

The Area of Study

The data for this study are one part of a larger research effort commissioned by the Sierra Economic Development District and the Sierra Planning Organization located in northeast California. The geographic area selected for study includes portions of El Dorado, Placer, Nevada, and Sierra counties. Particular portions of this four-county region were excluded from the sampling area because of a development pattern atypical to the region and because of severe development restrictions associated with physical isolation due to topography combined with federal ownership of land in a national forest. Excluded portions were the Lake Tahoe Basin and the nearby mountainous areas of Placer and El Dorado counties and southeastern portions of El Dorado and Placer counties. The estimated total population of this four-county region in 1978 was approximately 79,000.

Heterogeneous and sometimes competitive economic activities characterize the region. Commercial and residential land use with some farming and natural resource extraction
characterize the economic activities of the southwestern and southern sections of the study area. The central portion of the region is primarily oriented towards the service sector, construction, fruit growing, and cattle grazing. The economic activities characterizing the study area's northern section include cattle grazing, cottage industries, and timber extraction. Throughout the study area tourism is a very important economic activity with outdoor recreation constituting the major attraction (Napier, 1980a:1-3, 24).

Sample Selection

A systematic random sampling technique was used to select respondents within the designated four-county region. Data were collected during the summer and early fall of 1977. Detailed county maps were used to develop the sample frame for the systematic random sample. The sampling technique consisted of selecting the first house and every tenth occupied residence thereafter. Either the head of the household or mate was asked to participate in the study by completing a structured questionnaire. If the randomly selected individual declined to participate, interviewers were instructed to select the adjacent occupied residence to secure a respondent. When persons consented to participate in the study, they were presented with questionnaires which were explained in detail by the trained interviewers. The questionnaires were left with the respondents to be completed at their convenience and retrieved at a designated
future date, usually two days later. When interviewers returned to collect completed questionnaires, respondents were asked for additional comments about the study questions and any observations were recorded. Either heads of household or spouses were chosen as respondents because some of the requested information would not have been known to any other family members. Care was taken to ensure that the sample was not clustered in geographic space via close monitoring of the sample distribution by a trained field research coordinator. The research coordinator was a trained rural sociologist well versed in research methodology and sampling techniques. The coordinator maintained close contact with all interviewers. The final sample approximated proportionally the population distribution among towns, villages, and open-country areas in the region. Participation was completely voluntary. Approximately 75 percent of those selected by the sampling method agreed to participate in the study and actually completed questionnaires. The total number of respondents in the final sample was 640 adult residents (Napier, 1980a; 1980b).

A summary of selected study sample characteristics is presented in Table 1. These data show that the primary income earners tended to be middle-aged, the mean age of the sample being 49.01 years. The mean length of residence in the present county of residence was 11.71 years. Average education of head of household was 13.29 years, or
Table 1: Sample Frequencies and Summary Statistics for the Independent Variables (N=640)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>49.01</td>
<td>16.67</td>
</tr>
<tr>
<td>EDUCATION</td>
<td>13.29</td>
<td>2.92</td>
</tr>
<tr>
<td>LENGTH OF RESIDENCE</td>
<td>11.71</td>
<td>13.58</td>
</tr>
</tbody>
</table>

**EMPLOYMENT STATUS IN THE LAST THREE YEARS**

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed During Last 3 Years</td>
<td>143</td>
<td>22.3</td>
</tr>
<tr>
<td>Employed During Last 3 Years</td>
<td>366</td>
<td>57.2</td>
</tr>
<tr>
<td>Not Reported</td>
<td>131</td>
<td>20.5</td>
</tr>
</tbody>
</table>

**OCCUPATION**

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>76</td>
<td>11.9</td>
</tr>
<tr>
<td>Executive</td>
<td>27</td>
<td>4.2</td>
</tr>
<tr>
<td>Skilled White Collar and Small Business Owner</td>
<td>136</td>
<td>21.2</td>
</tr>
<tr>
<td>Skilled Blue Collar</td>
<td>155</td>
<td>24.2</td>
</tr>
<tr>
<td>Unskilled White Collar</td>
<td>79</td>
<td>12.3</td>
</tr>
<tr>
<td>Unskilled Blue Collar</td>
<td>98</td>
<td>15.3</td>
</tr>
<tr>
<td>Permanent Unemployed</td>
<td>9</td>
<td>1.4</td>
</tr>
<tr>
<td>Not Reported</td>
<td>60</td>
<td>9.4</td>
</tr>
</tbody>
</table>
approximately one year beyond the high school level. Of the total sample 22.3 percent of the primary income earners indicated that they had been unemployed at some time during the preceding three years. The largest occupational categories of the primary income earners were skilled blue collar (24.2 percent), skilled white collar and small business owner (21.2 percent), and unskilled blue collar (15.3 percent).

Instrument Construction

The structured questionnaire used for data collection in this study was designed to be self-administered. The interviewer explained the questionnaire in detail and left the questionnaire with respondents to be completed at their convenience. If respondents were unable to complete the questionnaire without assistance, the interviewer would administer it orally. The research techniques used to gather data included a Likert-type scale designed to measure commitment to technology as a means of problem solving (the dependent variable) and content-specific questions to secure socioeconomic data about the respondent and spouse (the independent variables) (Napier, 1980a:3). The technology scale items were developed from literature concerning technological impacts and technological change (Ellul, 1964, 1969; Foster, 1962; Mesthene, 1970; Ogburn, 1938, 1964; Roszak, 1969), the modernism and post-industrial theoretical literature (Bell, 1973; Inkeles and Smith, 1974; Kahl, 1968;
Lauer, 1977), and scalar theory (Greer, 1962; Napier, 1973; Wilson and Wilson, 1945).

Operationalization of the Independent Variables

The variables designated as independent variables in this study include age, education, employment status, length of residence, and occupation. These independent variables represent a range of possible investments which residents could possess and apply to exchange situations involving the introduction of more complex technologies in industries and individuals' lives in general. As discussed earlier, these investments include appropriate social characteristics (age, employment status) and appropriate past activities (education, length of residence, and occupation) that individuals might bring into activities relating to the introduction of technology.

**Age** was measured as the primary income earner's age in number of years at last birthday.

**Education** was measured in number of years of formal education completed by the primary income earner.

**Employment status** was measured as whether or not the primary income earner was unemployed at any time during the last three years, with "yes" equal to one and "no" equal to two.

**Length of residence** was measured in terms of the number of years the family had lived in the present county of
Occupation was reported as the occupation of the primary income earner. If the primary income earner was unemployed or retired, occupation was recorded as the last occupation before retirement or unemployment. The occupation question on the questionnaire was open-ended. Responses were classified into seven categories, including professional, executive, skilled white collar and small business owner, skilled blue collar, unskilled white collar, unskilled blue collar, and permanent unemployed. Occupations were weighted one through seven, with persons classified as professional receiving a value of one, as executive a value of two, as skilled white collar and small business owner a three, as skilled blue collar a value of four, as unskilled white collar a five, as unskilled blue collar a value of six, and as permanent unemployed a seven.

Adjustment to the Employment Status Variable

Because such a large percentage (20.5 percent) of respondents did not answer the employment status question, a decision had to be made as to whether this variable should be excluded from any further analyses. It is a general rule in social research that no variable should have more than 10 to 15 percent "missing data." One reason for this is that large percentages of "missing data" for any variable might alter the sample composition enough to make further use of
that variable unwise. For example, a particular segment of the study sample might choose not to answer a particular question and thus alter the sample profile for that question. In lieu of discarding the employment status variable altogether, it was decided to determine if some amount of self-selection might have been occurring on the employment status question. To do this, employment status was adjusted for retirement. Retirement was measured as whether or not the primary income earner was retired, with "yes" equal to one and "no" equal to two. If respondents indicated that the primary income earner was retired and these same respondents did not answer the employment status question, then it was assumed that the primary income earner had been either employed or retired during the past three years. That is, the "missing data" code for employment status was recoded to "no," or two. See Table 2 for both adjusted and unadjusted employment status summary statistics.

Table 2: Sample Frequencies and Summary Statistics for Unadjusted and Adjusted Employment Status Variable (N=640)

<table>
<thead>
<tr>
<th>Employment Status in Last 3 Years, Unadjusted for Retirement</th>
<th>Employment Status in Last 3 Years, Adjusted for Retirement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed During Last Three Years</td>
<td>143</td>
</tr>
<tr>
<td>Employed During Last Three Years</td>
<td>366</td>
</tr>
<tr>
<td>Not Reported</td>
<td>131</td>
</tr>
</tbody>
</table>
Operationalization of the Attitude Variable

A ten-item Likert-type scale was developed to gather data regarding attitude towards the introduction of more complex technologies in industries and individuals' lives in general. Technology was defined as machinery such as computers, new assembly line equipment, new farm machinery, and other mechanical means of production. The content of the scale items was based on the social exchange perspective discussed earlier. Statements of anticipated and/or perceived costs and benefits of technology were included. Also included were more general evaluations of technology. Such evaluations included goodness and badness, direct and indirect effects, and justifications for the introduction of more complex technologies in industries and individuals' lives in general.

Each of the ten scale item statements had five possible responses: strongly agree (SA), agree (A), undecided (U), disagree (D), and strongly disagree (SD). Responses were assigned scores from one through five, depending on whether the statement was positive or negative towards technology as a means of problem solution. Positive statements were weighted five through one from strongly agree to strongly disagree, while negative statements were weighted in the opposite direction, i.e., one through five from strongly agree to to strongly disagree. Higher scale scores, then, were defined as being positive towards technology.
The ten scale items and weighting values are presented in Table 3. As noted earlier, higher scale scores represent more positive orientations towards technology.

Reliability of the Attitude Scale

To test the reliability of the attitude towards technology scale the standardized item alpha method was used. The standardized item alpha method measures the total scale reliability of multiple-item additive scales such as the Likert-type scale developed for this study. Hull and Nie (1979) note that standardized item alpha is closely related to Cronbach's alpha,

perhaps the most widely used reliability coefficient . . . . In essence, if the observations on each item are standardized by dividing them by the standard deviation of the item, alpha would have the same value calculated by the . . . standardized item alpha (Hull and Nie, 1979:83).

The computational formula for standardized item alpha is given as:

\[
\alpha(s) = \frac{k\bar{r}}{1 + (k-1)\bar{r}}
\]

where \( k \) is the number of items in the scale and \( \bar{r} \) is the average correlation between items.

Scale reliability is measured as a positive number between 0.0 and 1.0, where, in general, the higher the reliability coefficient, the greater the reliability of the measurement instrument. In its simplest form the reliability coefficient indicates the consistency of the...
Table 3: Ten-Item Attitude Towards Technology Scale and Weighting Values for Each Item

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Technology usually improves efficiency.</td>
<td>SA</td>
<td>A</td>
<td>U</td>
<td>D</td>
<td>SD</td>
</tr>
<tr>
<td>2. Progress within the U.S. usually cannot be achieved without more complex technology.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. Most people within the U.S. benefit from technological advancements.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. Technology usually makes our lives more comfortable.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. Technology is the best way of solving most development problems within the U.S.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6. The social costs of technology are often greater than the benefits received.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7. Technology is basically good.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. Technology most often creates more problems than it solves.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9. Most of our energy problems will be solved by technology.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10. People should not block the development of technology within the U.S.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
measurement instrument. Using the standardized item alpha, then, the reliability of the ten-item attitude towards technology scale was 0.907, which indicates that the scale is reliable. The intercorrelations among the scale items used to compute the standardized item alpha are presented in Table 4. Since the reliability coefficient for the total scale was high and because there was a significant level of intercorrelation between the pairs of items comprising the attitude scale, it was concluded that the scale items could be combined into a composite index.

Analyses Used to Test the Theoretical Model

Multiple correlation analysis and regression analysis as well as one-way analysis of variance were selected to analyze the relationships among the variables in this study. The use of parametric procedures which theoretically require more rigorous assumptions concerning the distribution of the data (normality) as well as the level of measurement (interval or ratio), was deemed appropriate using the arguments formulated by Abelson and Tukey (1959), Coombs (1953), Labovitz (1970), and Nie, et al., (1975). Coombs (1953) argued that between ordinal and interval levels of measurement there is the ordered metric level. "An ordered metric consists of ordered categories where the relative ordering of the intercategory distances is known even though their absolute magnitude cannot be measured" (Nie, et al.,
Table 4: Correlation Matrix* and Standardized Item Alpha Reliability Coefficient**
for Attitude Towards Technology Scale (N=640)

<table>
<thead>
<tr>
<th></th>
<th>Item 1</th>
<th>Item 2</th>
<th>Item 3</th>
<th>Item 4</th>
<th>Item 5</th>
<th>Item 6</th>
<th>Item 7</th>
<th>Item 8</th>
<th>Item 9</th>
<th>Item 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 2</td>
<td>0.570</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 3</td>
<td>0.613</td>
<td>0.612</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 4</td>
<td>0.644</td>
<td>0.568</td>
<td>0.697</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 5</td>
<td>0.487</td>
<td>0.600</td>
<td>0.595</td>
<td>0.593</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 6</td>
<td>0.317</td>
<td>0.324</td>
<td>0.335</td>
<td>0.360</td>
<td>0.409</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 7</td>
<td>0.548</td>
<td>0.468</td>
<td>0.620</td>
<td>0.602</td>
<td>0.526</td>
<td>0.332</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 8</td>
<td>0.501</td>
<td>0.481</td>
<td>0.531</td>
<td>0.546</td>
<td>0.489</td>
<td>0.522</td>
<td>0.588</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Item 9</td>
<td>0.424</td>
<td>0.464</td>
<td>0.458</td>
<td>0.453</td>
<td>0.493</td>
<td>0.333</td>
<td>0.412</td>
<td>0.414</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Item 10</td>
<td>0.445</td>
<td>0.489</td>
<td>0.562</td>
<td>0.512</td>
<td>0.507</td>
<td>0.323</td>
<td>0.549</td>
<td>0.498</td>
<td>0.511</td>
<td>1.000</td>
</tr>
</tbody>
</table>

Standardized Item Alpha Reliability Coefficient = 0.907
Mean Inter-Item Correlation = 0.496

* All correlations are significant beyond the 0.001 level.

** Standardized Item Alpha is computed as:

\[ \alpha(s) = \frac{k \bar{r}}{1 + (k-1) \bar{r}} \]

where \( k \) equals the number of items in the scale and \( \bar{r} \) equals the average correlation between items.
Abelson and Tukey (1959) argue that ordered metric measurement approximates interval level measurement when numeric values are properly assigned to the categories. Labovitz (1970) carries the argument even further by stating that, except in extreme situations, interval statistics can be applied to any ordinal-level variable. Labovitz (1970) argues that the small error [which] may accompany the treatment of ordinal variables as interval . . . is offset by the use of more powerful, more sensitive, better developed, and more clearly interpretable statistics with known sampling error (Nie, et al., 1975:6).

The assumption was made, then, that the Likert scale scores and the occupation variable meet the ordered metric level requirements.

Multiple correlation analysis was used to test each hypothesis, i.e., to test the relationships among the variables of age, education, occupation, employment status, length of residence, and the attitudes towards technology scale. Regression analysis was selected to examine the strength of the theoretical model when all variables are considered simultaneously. The appropriateness of using these parametric measures is based on the arguments outlined above. Age, years of education, length of residence, and the Likert scale scores meet the metric measurement requirements as outlined by Abelson and Tukey (1959), Coombs (1953), and Nie, et al., (1975). Employment was treated as a two-category dummy variable. As stated earlier, it was
assumed that the occupation variable meets the ordered metric level requirements. It was assumed that relationships among the variables were linear. The variable means were assigned to all missing values in the dataset.

Recognizing that the assumption that occupation meets the metric measurement requirements could be challenged, a one-way analysis of variance was used to analyze the relationship between occupation and the attitude scale. Use of one-way analysis of variance was considered appropriate because the independent variable(s), in this case, occupation, can be non-metric (Nie, et al., 1975:399). The dependent variable for analysis of variance, in this case, attitude towards technology scale score, must be metric. It was decided to collapse the seven occupational categories into four categories. The unskilled occupations (unskilled white collar and unskilled blue collar) were combined into one category containing 27.6 percent of the sample; the skilled occupations (skilled white collar and skilled blue collar) were combined into one category containing 45.4 percent of the sample; the professional and executive occupations were combined into one category containing 16.1 percent of the sample; and the permanent unemployed and missing data were combined into one category containing 10.8 percent of the sample. The four categories used in this one-way analysis of variance, then, included professional-executive, skilled labor, unskilled labor, and permanent
unemployed-missing data. These four categories were used to test the linearity of the relationship between occupation and the dependent variable using analysis of variance. The results of all analyses are reported in the following chapter.
CHAPTER 3
RESEARCH FINDINGS

Multiple correlation and regression analyses as well as one-way analysis of variance were selected to test the research hypotheses. Multiple correlation analysis was used to examine the strength of the theoretical model when all variables were considered simultaneously. One-way analysis of variance was conducted to test for curvilinear relationships and error in measurement between occupation and the attitude scale.

Responses to the Attitude Items

Before hypothesis testing, response frequencies to each of the items comprising the attitude towards technology scale were examined. Responses to seven of the ten attitude scale items indicated that 50 percent or more of the respondents had favorable attitudes towards technology. As shown in Table 5, respondents generally believed that: (1) Technology is basically good (71.1 percent agreed); (2) Technology usually improves efficiency (69.2 percent agreed); (3) Most people within the U.S. benefit from technological advancements (69.1 percent agreed); (4) Technology usually makes our lives more comfortable (68.3 percent agreed).
Table 5: Response Frequencies for Each Scale Item Composing the Attitude Towards Technology, Presented as Absolute Frequencies and as Percentages\(^a\) in Parentheses (%) N=640

<table>
<thead>
<tr>
<th>Attitude Statement</th>
<th>SA</th>
<th>A</th>
<th>U</th>
<th>D</th>
<th>SD</th>
<th>No Response</th>
<th>(\bar{X}) Mean(^b)</th>
<th>Standard Deviation(^b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*1. Technology usually improves efficiency.</td>
<td>93</td>
<td>350</td>
<td>82</td>
<td>48</td>
<td>30</td>
<td>37</td>
<td>3.71</td>
<td>0.96</td>
</tr>
<tr>
<td></td>
<td>(14.5)</td>
<td>(54.7)</td>
<td>(12.8)</td>
<td>(7.5)</td>
<td>(4.7)</td>
<td>(5.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*2. Progress within the U.S. usually cannot be achieved without more complex technology.</td>
<td>68</td>
<td>278</td>
<td>102</td>
<td>119</td>
<td>31</td>
<td>42</td>
<td>3.39</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td>(10.6)</td>
<td>(43.4)</td>
<td>(15.9)</td>
<td>(18.6)</td>
<td>(4.8)</td>
<td>(6.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*3. Most people within the U.S. benefit from technological advancements.</td>
<td>74</td>
<td>368</td>
<td>90</td>
<td>45</td>
<td>19</td>
<td>44</td>
<td>3.72</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>(11.6)</td>
<td>(57.5)</td>
<td>(14.1)</td>
<td>(7.0)</td>
<td>(3.0)</td>
<td>(6.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*4. Technology usually makes our lives more comfortable.</td>
<td>74</td>
<td>363</td>
<td>92</td>
<td>48</td>
<td>22</td>
<td>41</td>
<td>3.70</td>
<td>0.89</td>
</tr>
<tr>
<td></td>
<td>(11.6)</td>
<td>(56.7)</td>
<td>(14.4)</td>
<td>(7.5)</td>
<td>(3.4)</td>
<td>(6.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*5. Technology is the best way of solving most development problems within the U.S.</td>
<td>47</td>
<td>203</td>
<td>190</td>
<td>115</td>
<td>40</td>
<td>45</td>
<td>3.17</td>
<td>1.01</td>
</tr>
<tr>
<td></td>
<td>(7.3)</td>
<td>(31.7)</td>
<td>(29.7)</td>
<td>(18.0)</td>
<td>(6.3)</td>
<td>(7.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>**6. The social costs of technology are often greater than the benefits received.</td>
<td>52</td>
<td>188</td>
<td>191</td>
<td>134</td>
<td>28</td>
<td>47</td>
<td>2.83</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>(8.1)</td>
<td>(29.4)</td>
<td>(29.8)</td>
<td>(20.9)</td>
<td>(4.4)</td>
<td>(7.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*7. Technology is basically good.</td>
<td>49</td>
<td>406</td>
<td>107</td>
<td>22</td>
<td>10</td>
<td>46</td>
<td>3.78</td>
<td>0.69</td>
</tr>
<tr>
<td></td>
<td>(7.7)</td>
<td>(63.4)</td>
<td>(16.7)</td>
<td>(3.4)</td>
<td>(1.6)</td>
<td>(7.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude Statement</td>
<td>SA</td>
<td>A</td>
<td>U</td>
<td>D</td>
<td>SD</td>
<td>No Response</td>
<td>$\bar{X}$ Mean</td>
<td>Standard Deviation</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-------------</td>
<td>------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>8. Technology most often creates more problems than it solves.</strong></td>
<td>27</td>
<td>98</td>
<td>195</td>
<td>237</td>
<td>40</td>
<td>43</td>
<td>3.28</td>
<td>0.93</td>
</tr>
<tr>
<td></td>
<td>(4.2)</td>
<td>(15.3)</td>
<td>(30.5)</td>
<td>(37.0)</td>
<td>(6.3)</td>
<td>(6.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>9. Most of our energy problems will be solved by technology.</strong></td>
<td>72</td>
<td>250</td>
<td>158</td>
<td>92</td>
<td>25</td>
<td>43</td>
<td>3.42</td>
<td>0.99</td>
</tr>
<tr>
<td></td>
<td>(11.2)</td>
<td>(39.1)</td>
<td>(24.7)</td>
<td>(14.4)</td>
<td>(3.9)</td>
<td>(6.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10. People should not block the development of technology within the U.S.</strong></td>
<td>84</td>
<td>276</td>
<td>140</td>
<td>65</td>
<td>27</td>
<td>48</td>
<td>3.55</td>
<td>0.97</td>
</tr>
<tr>
<td></td>
<td>(13.1)</td>
<td>(43.1)</td>
<td>(21.9)</td>
<td>(10.2)</td>
<td>(4.2)</td>
<td>(7.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL SCALE</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>34.55</td>
<td>6.88</td>
</tr>
</tbody>
</table>

* Percentages may not total 100.0 due to rounding error.

** Mean and Standard Deviation were calculated with missing data equal to mean response for each item.

* Items were weighted five through one on a Strongly Agree to Strongly Disagree continuum.

** Items were weighted one through five on a Strongly Agree to Strongly Disagree continuum.
agreed); (5) People should not block the development of technology within the U.S. (56.2 percent agreed); (6) Progress within the U.S. usually cannot be achieved without more complex technology (54.0 percent agreed); and (7) Most of our energy problems will be solved by technology (50.3 percent agreed). Although respondents tended to agree that "Technology is the best way of solving most development problems within the U.S." (39.0 percent agreed), a large portion indicated that they were undecided (29.7 percent), and 24.3 percent of the respondents disagreed. More negative or undecided attitudes towards technology were indicated by responses to the remaining attitude scale items. Exactly 50 percent of the respondents agreed or were undecided about the negative statement, "Technology most often creates more problems than it solves" (19.5 percent agreed and 30.5 percent were undecided). Respondents also indicated agreement with or were undecided about the negative statement, "The social costs of technology are often greater than the benefits received" (37.5 percent agreed and 29.8 percent were undecided, for a total of 67.3 percent of the respondents).

The mean score for the total attitude scale was 34.55 and the standard deviation was 6.88. This means that approximately 68 percent of the respondents' scores fell between a low of 27.67 and a high of 41.43. The lowest possible negative score a respondent could have, if all
scale items were answered, was a 10; the highest positive score, again if all scale items were answered, a 50. If respondents indicated that they were undecided about all of the scale items, their total scores would be 30. The mean total score of 34.55, therefore, indicates that respondents had only slightly favorable attitudes towards technology.

Because there was variation in the respondents' attitudes towards technology, examination of possible differentiating, explanatory variables seemed warranted. The examination was conducted using multiple correlation and regression analyses.

**Multiple Correlation Analysis**

Multiple correlation analysis was used to test the following hypotheses: (1) Age will be inversely related to favorable attitude towards technology; (2) Employment status will be inversely related to favorable attitude towards technology; (3) Length of residence will be inversely related to favorable attitude towards technology; (4) Occupational status will be positively related to attitude towards technology; and (5) Education will be positively related to attitude towards technology. The correlation matrix, indicating the strength of the relationship between all possible combinations of variables used in this study, is presented in Table 6.
Table 6: Observed Correlation Matrix for Selected Variables and Attitude Towards Technology

<table>
<thead>
<tr>
<th></th>
<th>AGE</th>
<th>EMPLOYMENT STATUS (Adj.)</th>
<th>LENGTH OF RESIDENCE</th>
<th>OCCUPATION</th>
<th>EDUCATION</th>
<th>ATTITUDE TOWARDS TECHNOLOGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMPLOYMENT STATUS (Adj.)</td>
<td>0.230*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LENGTH OF RESIDENCE</td>
<td>0.235*</td>
<td>0.076</td>
<td></td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCCUPATION</td>
<td>-0.046</td>
<td>-0.195*</td>
<td>0.052</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDUCATION</td>
<td>-0.246*</td>
<td>0.129*</td>
<td>-0.137*</td>
<td>-0.440*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>ATTITUDE TOWARDS TECHNOLOGY</td>
<td>0.055</td>
<td>0.045</td>
<td>-0.041</td>
<td>-0.047</td>
<td>0.012</td>
<td>1.000</td>
</tr>
</tbody>
</table>

* Significant at the .05 level.

The F-ratio was used to test the significance of r. The F-ratio formula is given as:

\[ F = \frac{r^2}{1 - r^2} (N - 2) \]

where \( r \) is the correlation coefficient and \( N \) is the number of cases in the sample.
The results of the multiple correlation analysis show that age, employment status, length of residence, occupation, and education were not significantly related to the attitude towards technology at the .05 level. These findings indicate that the hypotheses must be rejected. Since none of the correlations with the dependent variable was significant at the .05 level, the step-wise regression analysis also revealed no explained variance. See Table 7 for a summary of the regression analyses.

Analyses of Variance

A one-way analysis of variance was conducted to test for curvilinear relationships and error in measurement between occupation and the attitude scale.

Analysis of variance . . . assesses the effects of one or more categorical independent variables (factors), measured at any level upon a continuous dependent variable that is usually assumed to be measured at an interval level. Conceptually, the cases are divided into categories based on their values for each of the independent variables and the difference between the means of these categories on the dependent variable are tested for statistical significance (Nie, et al., 1975:9).

Analysis of variance basically compares between group variance with within group variance. The F-ratio is used to test the significance of this comparison. Eta-squared is a statistic that demonstrates the relative explanatory power of the criterion variable. The value of eta-squared is
Table 7: Summary Statistics of the Stepwise Regression of Attitude Towards Technology Scale with Selected Independent Variables

<table>
<thead>
<tr>
<th>Step</th>
<th>Standardized Regression (B) Coefficient(^a)</th>
<th>Multiple R(^b)</th>
<th>Multiple R(^2)</th>
<th>Entering F-Ratio(^d)</th>
<th>Total F-Ratio(^d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AGE</td>
<td>0.055</td>
<td>0.003</td>
<td>1.923</td>
<td>1.923</td>
</tr>
<tr>
<td>2</td>
<td>LENGTH OF RESIDENCE</td>
<td>-0.057</td>
<td>0.006</td>
<td>1.961</td>
<td>1.995</td>
</tr>
<tr>
<td>3</td>
<td>OCCUPATION</td>
<td>-0.055</td>
<td>-0.042</td>
<td>1.674</td>
<td>1.100</td>
</tr>
<tr>
<td>4</td>
<td>EMPLOYMENT STATUS (Adj.)</td>
<td>-0.056</td>
<td>-0.036</td>
<td>0.029</td>
<td>0.093</td>
</tr>
</tbody>
</table>

Computation was terminated after step 4 because the F-level was insufficient to warrant further calculation.

\(^a\) The beta (B) coefficient "shows the average number of units increase or decrease in the dependent variable which occur with each increase of a specified unit in the independent variable. Its exact size thus depends not only on the relation between the variables but also on the units in which each is stated. It can be reduced to another form...by stating each of the variables in units of its own standard deviation. In this form it has been termed B" (Ezekiel and Fox, 1959:147-148).

\(^b\) The multiple correlation coefficient (R) "measures the combined importance of the several independent factors as a means of explaining the differences in the dependent factor (Ezekiel and Fox, 1959:190-191).

\(^c\) The coefficient of determination is interpreted as the proportion of variance in the dependent variable which is explained by the independent variable.

\(^d\) The F-ratios are a measure of the significance of the entering variable of each regression step, and for the total regression model at each step in the analysis.
interpreted in much the same way as a regression multiple $R^2$, i.e., as the proportion of variance in the dependent variable explained by each factor (Nie, et al., 1975:404). If eta-squared equals zero, it indicates that there is no effect of the categorical independent variable (factor) on the dependent variable (Nie, et al., 1975:401). The above methods were used to test the relationship between occupation and the attitude towards technology scale.

For analysis of variance the seven occupational categories were collapsed into four categories: (1) professional-executive, comprising 16 percent of the respondents; (2) skilled labor, comprising 45 percent of the respondents; (3) unskilled labor, comprising 28 percent of the respondents; and (4) "other," including the permanent unemployed and missing data, comprising 11 percent of the respondents. This occupational breakdown is roughly based on the socio-economic class categorization of industrialized societies. In such societies the coordination of men, materials, and markets are brought together for production and distribution of goods. Individuals' skills and how well they "fit" role requirements are of primary importance in this particular form of societal organization (Bell, 1973:126-127).

The one-way analysis of variance results are presented in Table 8. As can be seen, the means of the attitude towards technology scale scores for the four occupational
Table 8: Summary of One-Way Analysis of Variance of Attitude Towards Technology by Occupation (N=640)

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>n</th>
<th>Category Mean</th>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Eta²</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional/Executive</td>
<td>103</td>
<td>34.91</td>
<td>EXPLAINED</td>
<td>22.547</td>
<td>3</td>
<td>7.516</td>
<td>0.158</td>
<td>0.924</td>
<td>0.0009</td>
</tr>
<tr>
<td>Skilled Labor</td>
<td>291</td>
<td>34.53</td>
<td>RESIDUAL</td>
<td>30224.348</td>
<td>636</td>
<td>47.523</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unskilled Labor</td>
<td>177</td>
<td>34.33</td>
<td>TOTAL</td>
<td>30246.895</td>
<td>639</td>
<td>47.335</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent Unemployed, Missing Data</td>
<td>69</td>
<td>34.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
categories show that the professional-executive category had the highest mean score, 34.9. The "other" category, including permanent unemployed and missing data, had the second highest mean (34.7), followed by skilled labor (34.5), and unskilled labor (34.3). The analysis of variance showed that the relationship between occupation and attitude towards technology was not statistically significant. The F-ratio, equal to 0.158, was not significant at the .05 level. The eta-squared was 0.0009 which means that the strength of the association was negligible. Analysis of variance indicated that the relationship between occupation and attitude towards technology was not statistically significant.

There was concern that there might be measurement error with the partitioning of occupation based on the industrialized society socioeconomic class categorization. For this reason two additional one-way analyses of variance were conducted. The partitioning of occupation was based on the Bell post-industrial societal structure schema (U.S. model) (Bell, 1973:375). In the Bell schema, post-industrial stratification is based on knowledge rather than property. Bell argues that the defining characteristic of this new system is the changed character of knowledge, where theoretical scientific research and development are of primary importance. A major question for the post-industrial model is not how well the individual might "fit" role requirements but how well the individual can make ideas "fit" into
theoretical paradigms "that can be translated into different and varied circumstances" (Bell, 1973:344).

For the first analysis of variance using the Bell typology, the seven occupational categories were collapsed into five categories: (1) professional, comprising 16 percent of the respondents; (2) technicians and semi-professional, comprising 21 percent of the respondents; (3) clerical and sales, comprising 12 percent of the respondents; (4) craftsmen and semi-skilled, comprising 40 percent of the respondents; and (5) "other," including the permanent unemployed and missing data, comprising 11 percent of the respondents. The results of the analysis of variance are presented in Table 9 (top table). As can be seen, the means of the attitude towards technology scale scores for the five occupational categories were as follows: (1) professional (34.91); (2) clerical and sales (34.75); (3) technicians and semi-professional (34.69); (4) "other," including the permanent unemployed and missing data (34.65); and (5) craftsmen and semi-skilled (34.24). The analysis of variance showed that the relationship between occupation and attitude towards technology was not statistically significant. The F-ratio, equal to 0.227, was not significant at the .05 level. The eta-squared was 0.0016 which means that the strength of the association was negligible.

For the second analysis of variance using the Bell typology, the seven occupational categories were collapsed
Table 9: Summary of One-Way Analyses of Variance of Attitude Towards Technology by Occupation, Categorized Using Bell's Post-Industrial Society Stratification Schema

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>n</th>
<th>Category Mean</th>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>103</td>
<td>34.91</td>
<td>EXPLAINED</td>
<td>43.207</td>
<td>4</td>
<td>10.802</td>
<td>0.227</td>
<td>0.923</td>
<td>0.0016</td>
</tr>
<tr>
<td>Technicians and Semi-professional</td>
<td>136</td>
<td>34.69</td>
<td>RESIDUAL</td>
<td>30203.688</td>
<td>635</td>
<td>47.565</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerical and Sales</td>
<td>79</td>
<td>34.75</td>
<td>TOTAL</td>
<td>30246.895</td>
<td>639</td>
<td>47.335</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Craftsmen and Semi-skilled</td>
<td>253</td>
<td>34.24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent Unemployed, Missing Data</td>
<td>69</td>
<td>34.65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupational Category</th>
<th>n</th>
<th>Category Mean</th>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional</td>
<td>103</td>
<td>34.91</td>
<td>EXPLAINED</td>
<td>42.387</td>
<td>3</td>
<td>14.129</td>
<td>0.290</td>
<td>0.833</td>
<td>0.0016</td>
</tr>
<tr>
<td>Technicians and Semi-professional</td>
<td>136</td>
<td>34.69</td>
<td>RESIDUAL</td>
<td>27656.793</td>
<td>567</td>
<td>48.777</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clerical and Sales</td>
<td>79</td>
<td>34.75</td>
<td>TOTAL</td>
<td>27699.180</td>
<td>570</td>
<td>48.595</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Craftsmen and Semi-skilled</td>
<td>253</td>
<td>34.25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
into four categories: (1) professional, comprising 18 percent of the respondents; (2) technicians and semi-professional, comprising 24 percent of the respondents; (3) clerical and sales, comprising 14 percent of the respondents; and (4) craftsmen and semi-skilled, comprising 44 percent of the respondents. All missing cases and the permanent unemployed were excluded from the second analysis of variance to determine if exclusion significantly altered the results of the analysis. The results of the second analysis of variance using the Bell typology are presented in Table 9 (bottom table). As can be seen, the means of the attitude towards technology scale scores for the four occupational categories were as follows: (1) professional (34.91); (2) clerical and sales (34.75); (3) technicians and semi-professional (34.69); and (4) craftsmen and semi-skilled (34.25). The analysis of variance showed that the relationship between occupation and attitude towards technology was not statistically significant. The F-ratio, equal to 0.290, was not significant at the .05 level. The eta-squared was 0.0016 which means that the strength of the association was negligible. The results of these two additional analyses of variance, where occupation was partitioned using Bell's post-industrial society schema (Bell, 1973:375), indicated that the relationship between occupation and attitude towards technology was not statistically significant. The initial rejection of the hypothesis
regarding occupation, based on the multiple correlation and regression analyses, was strengthened by the analyses of variance results.

One-way analysis of variance was also used to test the operationalization of the employment status variable. These additional analyses were conducted to ensure that the employment status variable was not contaminated by mixing those retired respondents who had not answered the employment status question with those respondents who had indicated that they had not been unemployed during the past three years. Three one-way analyses of variance were conducted to test for possible operationalization problems. For the first analysis, responses to the employment status question were divided into three categories: (1) unemployed at some time during the last three years, comprising 24 percent of the respondents; (2) not unemployed during the last three years, comprising 60 percent of the respondents; and (3) retired respondents who had not responded to the employment status question, comprising 16 percent of the respondents. Missing data were excluded from the first analysis. For the second analysis of variance, employment status was categorized into two groups: (1) unemployed at some time during the last three years, comprising 28 percent of the respondents, and (2) not unemployed during the last three years, comprising 72 percent of the respondents. All missing cases were excluded from the second analysis.
Employment status was categorized into two groups for the third analysis of variance: (1) unemployed at some time during the last three years, comprising 23 percent of the respondents, and (2) not unemployed during the last three years, including retired respondents who had not answered the employment status question, comprising 77 percent of the respondents. Missing data were excluded from the third analysis.

Results of the three analyses of variance are presented in Table 10. Each of the analyses of variance showed that, regardless of whether the retired were included or excluded among those respondents who indicated that they had not been unemployed during the last three years or whether the retired among the missing cases were considered as a separate category, the relationship between employment status and attitude towards technology was not statistically significant. None of the F-ratios was significant at the .05 level. The eta-squared for each of the analyses of variance was extremely low, meaning that the strength of the association was negligible in each of the analyses. The results of these additional analyses of variance indicate that the employment status variable was not contaminated by adjusting missing data for retirement. In addition, the initial rejection of the hypothesis regarding employment status, based on the multiple correlation and regression
Table 10: Summary of One-Way Analyses of Variance of Attitude Towards Technology by Employment Status

ATTITUDE TOWARDS TECHNOLOGY BY EMPLOYMENT STATUS, WITH RETIRED AMONG MISSING DATA AS SEPARATE CATEGORY (Grand Mean = 34.62)

<table>
<thead>
<tr>
<th>Employment Category</th>
<th>n</th>
<th>Category Mean</th>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>143</td>
<td>34.04</td>
<td>EXPLAINED</td>
<td>88.781</td>
<td>2</td>
<td>44.391</td>
<td>0.933</td>
<td>0.394</td>
<td>0.0036</td>
</tr>
<tr>
<td>Not Unemployed</td>
<td>366</td>
<td>34.92</td>
<td>RESIDUAL</td>
<td>28845.875</td>
<td>606</td>
<td>47.600</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retired</td>
<td>100</td>
<td>34.34</td>
<td>TOTAL</td>
<td>28934.656</td>
<td>608</td>
<td>47.590</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ATTITUDE TOWARDS TECHNOLOGY BY EMPLOYMENT STATUS, MISSING DATA OMITTED (Grand Mean = 34.67)

<table>
<thead>
<tr>
<th>Employment Category</th>
<th>n</th>
<th>Category Mean</th>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>143</td>
<td>34.04</td>
<td>EXPLAINED</td>
<td>79.559</td>
<td>1</td>
<td>79.558</td>
<td>1.697</td>
<td>0.193</td>
<td>0.0036</td>
</tr>
<tr>
<td>Not Unemployed</td>
<td>366</td>
<td>34.92</td>
<td>RESIDUAL</td>
<td>23762.465</td>
<td>507</td>
<td>46.869</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>23842.023</td>
<td>508</td>
<td>46.933</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

ATTITUDE TOWARDS TECHNOLOGY BY EMPLOYMENT STATUS, WITH ADJUSTMENT TO MISSING DATA FOR RETIRED (Grand Mean = 34.62)

<table>
<thead>
<tr>
<th>Employment Category</th>
<th>n</th>
<th>Category Mean</th>
<th>Source of Variation</th>
<th>Sum of Squares</th>
<th>DF</th>
<th>Mean Square</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>143</td>
<td>34.04</td>
<td>EXPLAINED</td>
<td>62.371</td>
<td>1</td>
<td>62.371</td>
<td>1.311</td>
<td>0.253</td>
<td>0.0025</td>
</tr>
<tr>
<td>Not Unemployed</td>
<td>466</td>
<td>34.80</td>
<td>RESIDUAL</td>
<td>28872.285</td>
<td>607</td>
<td>47.566</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>TOTAL</td>
<td>28934.656</td>
<td>608</td>
<td>47.590</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
analyses, was strengthened by these analyses of variance results.

**Summary of Findings**

The research findings may be summarized as follows:

(1) Respondents had only slightly favorable attitudes towards technology as indicated by their responses to the attitudes towards technology scale items and (2) None of the independent variables, age, employment status, length of residence, occupation, and education, were significant in explaining the variance in attitude towards technology.

**Supplemental Analyses: Selection of Alternate Variables**

Because none of the sociodemographic variables selected to represent the theoretical concepts were good predictors of attitude towards technology, additional factors which appear to represent other dimensions of the model and were available for analysis were examined. Among the alternate variables representing investments are: health status, income, job satisfaction, job skills, type of company which employs individuals, and potential employment of other family members (specifically children) when they reach eighteen years of age. Those individuals who have more appropriate investments to bring to an exchange situation involving the introduction of more complex technologies have a higher probability of gaining more rewards (benefits) from the introduction of technology. Since these individuals
with higher investments are more likely to gain more rewards from the introduction of technology, they will likely perceive that they will secure more benefits for themselves. And because they perceive that the introduction of newer technologies might provide the means whereby they could secure more benefits, they should have more favorable attitudes towards technology. A brief summary of why each of the alternate variables might be considered an investment follows.

**Health status** is an investment variable in that it is indicative of how "able" the individual is to benefit from the introduction of more complex technologies. Those individuals with better health statuses will tend to have more favorable attitudes towards technology because they would likely be able to secure more benefits from its introduction. The argument could be made, however, that persons in poor health would have more favorable attitudes towards technology because they would see it as providing the means of ending poor health. It is reasoned, however, that persons in poor health could as likely perceive technology as providing false hopes or as not having "delivered" for them yet. Thus, it is suggested that health status will be positively related to favorable attitudes towards technology.

**Income** is an investment variable in that it is indicative of the magnitude of benefits the individual is securing
from the current technological order as well as how much the individual might profit from the introduction of more complex technologies. Persons with higher incomes are most likely to be individuals with the higher-level skills. They probably have already invested considerable time and effort into the development and perfection of these high-level skills, so they should have a relative advantage in securing the benefits of newer technologies. **Income will be positively related to favorable attitudes towards technology.**

How well the individual thinks his **work skills** match his current job requirements indicates to some degree the individual's perceptions of how his current costs and benefits relative to his particular work situation balance with what he perceives as his past investments in the development and refinement of his work-related skills. Much the same reasoning may be applied to **job satisfaction**. It is argued that persons who are dissatisfied in their current work situations will have significantly different attitudes towards technology than do those who are satisfied with their jobs. In addition, it is argued that persons who do not believe that their work skills are being fully utilized in their present work situations will have significantly different attitudes towards technology than do those who believe that their skills and their work requirements are consistent. The introduction of more complex technologies may be seen as providing the means whereby unsatisfactory
work situations may be altered. For these reasons, then, it is suggested that job satisfaction will be negatively related to attitude towards technology. And, work skills will be significantly related to attitude towards technology.

The type of company which employs individuals may indicate the degree to which both the company and the individuals have already invested in technology as a means of problem resolution. If the utilization of complex technologies is already commonplace, it is more likely that individuals working for these more high-technology-type companies will not perceive the introduction of more complex technologies as an employment threat. Given the nature of technology, they will probably have already adjusted to many changes in technology. However, individuals who work for those companies that are not yet technology-intensive or are in the process of adopting newer, more complex technologies may perceive technology as a threat to their jobs. Type of company will be significantly related to attitude towards technology.

Potential local employment for family members, specifically children when they reach eighteen years of age, should have an effect on attitude towards technology. As noted in the introduction to this research, advocates of an economically-oriented development strategy with technology as the driving mechanism emphasize that such a development
policy will keep rural youth in the area, thus reversing the 
"youth drain." It is assumed that the benefits of employ- 
ment for their children are viewed positively, outweighing 
the costs that the introduction of more complex technologies 
might bring. It is argued, then, that individuals who anti- 
cipate that the introduction of more complex technologies 
will keep their children in the local area will have more 
favorable attitudes towards technology. Potential local 
employment for children will be significantly related to 
attitude towards technology.

A summary of selected alternate variables is presented 
in Table 11. These data show that the majority of respon- 
dents ranked their health status as above average to 
excellent. Respondents indicated that they were satisfied 
with their jobs, with 59.5 percent indicating high degrees 
of job satisfaction. A majority (69.4 percent) of the 
respondents indicated that their job skills matched their 
present job requirements. Of the total sample, 18.3 percent 
indicated that they believed their 18-year-old children 
could find local employment. Public service (19.8 percent), 
construction (11.7 percent), and sales (9.2 percent) were 
the largest company type categories. A majority of respon- 
dents (52.1 percent) had total income levels from $14,000 
and above.
Table 11: Sample Frequencies and Summary Statistics for the Alternate Variables (N=640)

<table>
<thead>
<tr>
<th>HEALTH STATUS</th>
<th>Code</th>
<th>n</th>
<th>%</th>
<th>JOB SATISFACTION</th>
<th>Code</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Poor</td>
<td>0</td>
<td>12</td>
<td>1.9</td>
<td>Likes</td>
<td>0</td>
<td>201</td>
<td>31.4</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>9</td>
<td>1.4</td>
<td></td>
<td>1</td>
<td>84</td>
<td>13.1</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>10</td>
<td>1.6</td>
<td></td>
<td>2</td>
<td>96</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>14</td>
<td>2.2</td>
<td></td>
<td>3</td>
<td>34</td>
<td>5.3</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>24</td>
<td>3.7</td>
<td></td>
<td>4</td>
<td>17</td>
<td>2.7</td>
</tr>
<tr>
<td>Average</td>
<td>5</td>
<td>94</td>
<td>14.7</td>
<td>Somewhat Likes</td>
<td>5</td>
<td>63</td>
<td>9.8</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>31</td>
<td>4.8</td>
<td></td>
<td>6</td>
<td>18</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>38</td>
<td>5.9</td>
<td></td>
<td>7</td>
<td>14</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>8</td>
<td>91</td>
<td>14.2</td>
<td></td>
<td>8</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>98</td>
<td>15.3</td>
<td></td>
<td>9</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>Excellent</td>
<td>10</td>
<td>183</td>
<td>28.6</td>
<td>Hates</td>
<td>10</td>
<td>10</td>
<td>1.6</td>
</tr>
<tr>
<td>Not Reported</td>
<td></td>
<td>36</td>
<td>5.6</td>
<td>Not Reported</td>
<td></td>
<td>79</td>
<td>12.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>JOB SKILLS MATCH</th>
<th>n</th>
<th>%</th>
<th>LOCAL EMPLOYMENT OPPORTUNITIES FOR 18-YEAR OLD CHILDREN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Over Trained</td>
<td>95</td>
<td>14.8</td>
<td>Yes</td>
</tr>
<tr>
<td>Skills Match</td>
<td>444</td>
<td>69.4</td>
<td>No</td>
</tr>
<tr>
<td>Under Trained</td>
<td>7</td>
<td>1.1</td>
<td>Do Not Know</td>
</tr>
<tr>
<td>Not Reported</td>
<td>94</td>
<td>14.7</td>
<td>Does Not Apply</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Do Not Know</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Does Not Apply</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not Reported</td>
</tr>
</tbody>
</table>
Table 11 (continued)

**TYPE OF COMPANY BY WHICH EMPLOYED**

<table>
<thead>
<tr>
<th>Category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Industry</td>
<td>36</td>
<td>5.6</td>
</tr>
<tr>
<td>Light Industry</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td>Construction</td>
<td>75</td>
<td>11.7</td>
</tr>
<tr>
<td>Education</td>
<td>46</td>
<td>7.2</td>
</tr>
<tr>
<td>Public Service</td>
<td>127</td>
<td>19.8</td>
</tr>
<tr>
<td>Timber</td>
<td>25</td>
<td>3.9</td>
</tr>
<tr>
<td>Agriculture</td>
<td>12</td>
<td>1.9</td>
</tr>
<tr>
<td>Service</td>
<td>30</td>
<td>4.7</td>
</tr>
<tr>
<td>Small Business</td>
<td>40</td>
<td>6.3</td>
</tr>
<tr>
<td>Professional</td>
<td>24</td>
<td>3.7</td>
</tr>
<tr>
<td>Sales</td>
<td>59</td>
<td>9.2</td>
</tr>
<tr>
<td>Recreation</td>
<td>8</td>
<td>1.2</td>
</tr>
<tr>
<td>Transportation</td>
<td>44</td>
<td>6.9</td>
</tr>
<tr>
<td>Communication</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td>Not Reported</td>
<td>82</td>
<td>12.8</td>
</tr>
</tbody>
</table>

**TOTAL INCOME**

<table>
<thead>
<tr>
<th>Income Interval</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0-999</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>$1,000-1,999</td>
<td>2</td>
<td>0.3</td>
</tr>
<tr>
<td>$2,000-2,999</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>$3,000-3,999</td>
<td>6</td>
<td>0.9</td>
</tr>
<tr>
<td>$4,000-4,999</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>$5,000-5,999</td>
<td>13</td>
<td>2.0</td>
</tr>
<tr>
<td>$6,000-6,999</td>
<td>15</td>
<td>2.3</td>
</tr>
<tr>
<td>$7,000-7,999</td>
<td>10</td>
<td>1.6</td>
</tr>
<tr>
<td>$8,000-8,999</td>
<td>21</td>
<td>3.3</td>
</tr>
<tr>
<td>$9,000-9,999</td>
<td>22</td>
<td>3.4</td>
</tr>
<tr>
<td>$10,000-10,999</td>
<td>26</td>
<td>4.1</td>
</tr>
<tr>
<td>$11,000-11,999</td>
<td>24</td>
<td>3.7</td>
</tr>
<tr>
<td>$12,000-12,999</td>
<td>24</td>
<td>3.7</td>
</tr>
<tr>
<td>$13,000-13,999</td>
<td>13</td>
<td>2.0</td>
</tr>
<tr>
<td>$14,000-14,999</td>
<td>17</td>
<td>2.7</td>
</tr>
<tr>
<td>$15,000-15,999</td>
<td>18</td>
<td>2.8</td>
</tr>
<tr>
<td>$16,000-16,999</td>
<td>18</td>
<td>2.8</td>
</tr>
<tr>
<td>$17,000-17,999</td>
<td>22</td>
<td>3.4</td>
</tr>
<tr>
<td>$18,000-18,999</td>
<td>21</td>
<td>3.3</td>
</tr>
<tr>
<td>$19,000-19,999</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td>$20,000-29,000</td>
<td>28</td>
<td>4.4</td>
</tr>
<tr>
<td>$21,000-21,999</td>
<td>11</td>
<td>1.7</td>
</tr>
<tr>
<td>$22,000-22,999</td>
<td>21</td>
<td>3.3</td>
</tr>
<tr>
<td>$23,000-23,999</td>
<td>7</td>
<td>1.1</td>
</tr>
<tr>
<td>$24,000-24,999</td>
<td>28</td>
<td>4.4</td>
</tr>
<tr>
<td>$25,000-29,999</td>
<td>55</td>
<td>8.6</td>
</tr>
<tr>
<td>$30,000 and above</td>
<td>71</td>
<td>11.1</td>
</tr>
<tr>
<td>Not Reported</td>
<td>126</td>
<td>19.7</td>
</tr>
</tbody>
</table>

**Category Assignment Using Bell's Typology**

- Goods-Producing II
- Health, Education, Research, Government V
- Extractive I
- Business and Finance IV
- Health, Education, Research, Government V
- Transportation, Recreation III
- Transportation, Recreation III
- Transportation, Recreation III

117
Supplemental Analyses: Operationalization of Alternate Independent Variables

The following variables were designated as alternate independent variables in this study: health status, income, job satisfaction, job skills, type of company by which individuals are employed, and potential local employment for family members, specifically children when they reach eighteen years of age. These alternate variables represent a range of possible investments which residents could possess and apply to exchange situations involving the introduction of more complex technologies in industries and individuals' lives in general.

**Health status** was measured by asking respondents to indicate along a continuum of 0 to 10 the present health status of the primary income earner. A value of zero indicated "very poor health" while a value of ten indicated "excellent health."

**Income** was measured by asking respondents to indicate which income category best represented the total family income (before taxes) during the last year (1 January 1977 to 1 January 1978). There were 27 income categories. The categories were weighted 1 through 27, where 1 represented $0-$999 income and 27 represented income of $30,000 and above.

**Job satisfaction** was measured by asking respondents to indicate along a continuum of 0 to 10 how the primary income
earner feels about his present job or if retired or unemployed, how he felt about his last job. A value of zero indicated that the person "likes the job very much" while a value of ten indicated that the person "hates the job very much."

Respondents were asked to indicate how well the primary income earner's present job skills match job requirements. There were three response categories among which respondents could choose: (1) over-trained for the job, (2) work skills match job requirements, and (3) under-trained for the job. These categories were weighted one through three with over-trained receiving a value of one, work skills match receiving a value of two, and under-trained receiving a value of three.

Type of company was measured by asking respondents to indicate which type of company best described the type of company in which the primary income earner was employed. There were 15 response categories, including heavy industry, light industry, construction, education, public service, timber, agriculture, service, small business, professional practice, mining, sales, recreation, transportation, and communication.

Potential local employment for family members, specifically children when they reach eighteen years of age, was measured as whether or not respondents believed their children would be able to secure local employment when they
reached eighteen years of age. A "yes" response was equal to one, a "no," equal to two. Provision was also made for "don't know," which was weighted three, and for "not applicable," weighted four.

Analyses Used to Test Alternate Variables

Pearson product-moment correlation analysis and one-way analysis of variance were selected to analyze the relationship between each alternate variable and the dependent variable. Because the Pearson product-moment correlation analysis is only appropriate for interval level measures, it was used to analyze the relationship between health status and the attitude towards technology scale, between job satisfaction and the attitude towards technology scale, and between income and the attitude towards technology scale. Based on the arguments formulated by Abelson and Tukey (1959), Coombs (1953), Labovitz (1970), and Nie, et al., (1975), it was assumed that the attitude towards technology scale score, a Likert-type instrument, and health status, job satisfaction, and income variables meet the ordered metric level requirements. Please refer to the "Analyses Used to Test the Theoretical Model" section in chapter two of this research for a summary of the Abelson and Tukey (1959), Coombs (1953), Labovitz (1970), and Nie, et al., (1975) arguments. The variable means were assigned to all missing values for the job satisfaction and health status variables. Missing data were excluded from the income
variable. These data were excluded because such a high percentage of respondents, 19.7 percent, did not answer the question. It was feared that assigning the item mean to these missing data would adversely effect the statistical analyses.

One-way analysis of variance was considered appropriate for analyzing the relationship between job skills and the attitude towards technology scale, between type of company and the attitude towards technology scale, and between potential local employment for family members, specifically children when they reach 18 years of age, and the attitude towards technology scale. Use of one-way analysis of variance was considered appropriate because the independent variable(s) can be non-metric (Nie, et al., 1975:399). The dependent variable for analysis of variance, in this case, attitude towards technology, must be metric. A description of how each of these independent variables was categorized follows.

The four job skills categories were collapsed into two categories. The over-trained and under-trained were combined into one category (skills do not match job requirements), comprising 15.9 percent of the sample. The second category (skills match job requirements) comprised 69.4 percent of the sample. Missing data, comprising 14.7 percent of the sample, were excluded.
The type of company categories were collapsed into five categories. To examine the relationship between type of company which employs individuals and attitude towards technology, Bell's distribution of economic sectors in his general schema of social change was used to categorize companies (Bell, 1975:117). The extractive type companies or industries (timber and agriculture) were combined into one category containing 5.8 percent of the sample; the goods-producing type companies (heavy industry, light industry, and construction) were combined into one category containing 19.8 percent of the sample; transportation, recreation, and communication were combined into one category containing 10.6 percent of the sample; the business, service, finance types of companies (service, small business, and sales) were combined into one category containing 20.2 percent of the sample; and the health, education, government, research types of companies (education, public service, and professional) were combined into one category containing 30.7 percent of the sample. Missing data comprising 12.8 percent of the total sample were excluded.

The potential local employment for family members, specifically children when they reach 18 years of age, variable was divided into four categories. Those who believed that their children would be able to get local jobs when they reach 18 years of age comprised one category with 18.3 percent of the sample. Those who did not believe their
children would be able to get local jobs when they reached 18 years of age comprised a second category with 12.7 percent of the sample. A third category was "do not know" and it comprised 21.6 percent of the sample. "Does not apply" was a fourth category comprising 22.3 percent of the sample. Missing data comprising 25.2 percent of the sample were excluded.

One-way analysis of variance was used to assess the relationship between each of these three independent variables (job skills, type of company, and potential local employment) and the dependent variable, the attitude towards technology scale.

Supplemental Analyses: Pearson Correlation Analyses

Pearson product-moment correlation analysis was used to test the following alternate hypotheses: 1) Health status will be positively related to favorable attitude towards technology; 2) Income will be positively related to attitude towards technology; and 3) Job satisfaction will be negatively related to attitude towards technology. Pearsonian correlation coefficients were calculated for each of these variables to test the strength and direction of the linear relationship between each of the variables and the dependent variable. Results are presented in Table 12.

The results of the correlation analysis show that health status was not significantly related to attitude
Table 12: Pearson Product-Moment Correlation Coefficients for Selected Alternate Variables and Attitude Towards Technology

<table>
<thead>
<tr>
<th>HEALTH STATUS (N=640)</th>
<th>JOB SATISFACTION (N=640)</th>
<th>INCOME (N=514)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTITUDE TOWARDS TECHNOLOGY</td>
<td>0.063</td>
<td>-0.066*</td>
</tr>
</tbody>
</table>

* Significant at the .05 level.

"Significance tests...for each coefficient...are derived from the use of Student's t with N-2 degrees of freedom for the computed quantity" (Nie, et al., 1975:281).

\[
1/2
\text{Student's } t = r \frac{N - 2}{1 - r^2}
\]

where \( r \) is the correlation coefficient and \( N \) is the number of cases.

towards technology at the .05 level. This finding indicates that the hypothesis must be rejected. Job satisfaction was significantly related to attitude towards technology at the .05 level. However, when the correlation coefficient, \( r \), is squared, \(-0.066^2\), the resulting value, \( r^2 \), "a measure of the proportion of variance in one variable explained by the other" (Nie, et al., 1975:279), is only 0.004. This means that the strength of the relationship between job satisfaction and attitude towards technology is near zero. Income was related to attitude towards technology at the .05 level of significance. However, when the correlation coefficient, \( r \), is squared \(0.145^2\), \( r^2 \) is only 0.021. This means that only two percent of the variance is explained; thus, the strength of the relationship between income and attitude
towards technology is miniscule. Based on the evidence from these data both the job satisfaction and income hypotheses were accepted; however, the $r^2$ values were so low that the relationships have little substantive meaning.

**Supplemental Analyses: Analyses of Variance Results**

One-way analysis of variance was used to test each of the following alternate hypotheses: 1) **Work skills** will be significantly related to attitude towards technology; 2) **Potential local employment for children** will be significantly related to attitude towards technology; and 3) **Type of company** will be significantly related to attitude towards technology.

The one-way analyses of variance results are presented in Table 13. The means of the attitude towards technology scale scores for the two work skills categories show that those who believed that their work skills matched their work requirements had the higher mean score, 34.81, while those who believed that their work skills did not match their work requirements had a mean score of 34.31. The analysis of variance for this variable showed that the relationship between work skills and attitude towards technology was not significant. The F-ratio, equal to 0.448, was not significant at the .05 level. The eta-squared was 0.0009 which means that the strength of the association was negligible.
Table 13: Summary of One-Way Analyses of Variance of Attitude Towards Technology by Work Skills, Local Employment Potential for Children, and Type of Company

### ATTITUDE TOWARDS TECHNOLOGY BY WORK SKILLS (Grand Mean = 34.72)

<table>
<thead>
<tr>
<th>Work Skills Category</th>
<th>n</th>
<th>Category Mean</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skills Do Not Match</td>
<td>102</td>
<td>34.31</td>
<td>0.448</td>
<td>0.503</td>
<td>0.0009</td>
</tr>
<tr>
<td>Skills Match</td>
<td>444</td>
<td>34.81</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ATTITUDE TOWARDS TECHNOLOGY BY LOCAL EMPLOYMENT POTENTIAL FOR CHILDREN (Grand Mean = 34.60)

<table>
<thead>
<tr>
<th>Local Employment Potential Category</th>
<th>n</th>
<th>Category Mean</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>117</td>
<td>35.71</td>
<td>1.652</td>
<td>0.177</td>
<td>0.01</td>
</tr>
<tr>
<td>No</td>
<td>81</td>
<td>33.68</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do Not Know</td>
<td>138</td>
<td>34.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does Not Apply</td>
<td>143</td>
<td>34.29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### ATTITUDE TOWARDS TECHNOLOGY BY TYPE OF COMPANY (Grand Mean = 34.67)

<table>
<thead>
<tr>
<th>Company Type Category</th>
<th>n</th>
<th>Category Mean</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extractive</td>
<td>37</td>
<td>33.18</td>
<td>1.158</td>
<td>0.328</td>
<td>0.0081</td>
</tr>
<tr>
<td>Goods-Producing</td>
<td>127</td>
<td>35.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation, Recreation, Communication</td>
<td>68</td>
<td>34.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business, Service, Finance</td>
<td>129</td>
<td>35.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health, Education, Government, Research</td>
<td>197</td>
<td>34.28</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The means of the four local employment potential categories show that those who believed that their children would be able to find local employment had the highest mean score, 35.71, followed by those who indicated that they did not know (34.51), and those for whom the question did not apply (34.29). Those who indicated that they did not believe their children would be able to find local employment had the lowest mean score, 33.68. The analysis of variance showed that the relationship between local employment potential and attitude towards technology was not statistically significant. The F-ratio, equal to 1.652, was not significant at the .05 level. The eta-squared was 0.01 which means that the strength of the association was negligible, i.e., only one percent of the variance is explained.

The means of the five company type categories show the business, service, finance category had the highest mean score, 35.43. The goods-producing category had the second highest mean score (35.08), followed by the transportation, recreation, communication category (34.41), and the health, education, government, research category (34.28). The lowest mean score was registered by the extractive category, 33.18. The analysis of variance showed that the relationship between type of company and attitude towards technology was not statistically significant. The F-ratio, equal to 1.158, was not significant at the .05 level. The
eta-squared was 0.0081 which means that the strength of the association was negligible.

An additional one-way analysis of variance was used to test the operationalization of the type of company variable. This additional analysis was conducted to determine if excluding the extractive company type from the categories analyzed would significantly alter the results. The extractive category comprised 5.8 percent of the sample. For this additional analysis of variance the company types were divided into four categories: (1) goods-producing, comprising 19.8 percent of the sample; (2) transportation, recreation, and communication, comprising 10.6 percent of the sample; (3) business, service, and finance, comprising 20.2 percent of the sample; and (4) health, education, government, and research, comprising 30.7 percent of the sample. Missing data, comprising 12.8 percent of the sample, and extractive, comprising 5.8 percent of the sample, were excluded.

The results of this analysis of variance are presented in Table 14. The means of the four company type categories show that the business, service, finance had the highest mean score (35.43) followed by the goods-producing category (35.09), the transportation, recreation, communication category (34.41), and the health, education, government, research category (34.28). This analysis of variance showed that the relationship between type of company and attitude
Table 14: Summary of One-Way Analysis of Variance of Attitude Towards Technology by Type of Company, with Extractive-Type Companies Excluded

ATTITUDE TOWARDS TECHNOLOGY BY TYPE OF COMPANY, EXTRACTIVE EXCLUDED (Grand Mean = 34.78)

<table>
<thead>
<tr>
<th>Company Type Category</th>
<th>n</th>
<th>Category Mean</th>
<th>F</th>
<th>Significance of F</th>
<th>Eta²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods-Producing</td>
<td>127</td>
<td>35.09</td>
<td>0.915</td>
<td>0.433</td>
<td>0.0049</td>
</tr>
<tr>
<td>Transportation, Recreation, Communication</td>
<td>68</td>
<td>34.41</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business, Service, Finance</td>
<td>129</td>
<td>35.43</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health, Education, Government, Research</td>
<td>197</td>
<td>34.28</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

towards technology was not statistically significant. The F-ratio was 0.915, not significant at the .05 level. The eta-squared was 0.0049 which means that the strength of the association was negligible. The results of this additional analysis of variance indicate that including or excluding the extractive company type from the analysis of variance categories did not alter the results.

Summary of Supplemental Analyses Findings

The findings of the supplemental analyses may be summarized as follows: (1) Neither health status, work skills, local employment potential for children, nor type of company were significant in explaining the variance in
attitude towards technology and (2) Income and job satisfaction had significant relationships with the attitude towards technology scale score, but these findings have little substantive meaning because the strengths of the associations between each of these variables and the attitude towards technology variable were negligible. Only two percent of the variance in attitude towards technology was explained by income; less than one percent was explained by job satisfaction.
CHAPTER 4
SUMMARY AND CONCLUSIONS

The primary purpose of this study was to investigate the attitude of rural residents towards technology. A theoretical framework, based on the growth ethos, was developed and used to derive hypotheses about perceptions of technology. The philosophical roots of this growth ethos as well as three specific theoretical orientations towards growth and development were discussed in detail. Social exchange theory, a utilitarianism-based theoretical perspective, was used in this research to formulate testable hypotheses. The theoretical model developed for this study posited that individuals with more appropriate investments vis-a-vis technology should have more favorable attitudes towards technology because they will anticipate receiving more benefits from the introduction of more complex technologies.

Age, employment status, length of residence, occupational status, and education were selected to represent investments. The attitude towards technology variable was operationalized as a Likert-type attitude scale. To test the reliability of the attitude towards technology scale,
the standardized item alpha method was used. Multiple correlation analysis was used to test each hypothesis. Regression analysis was selected to examine the strength of the theoretical model when all variables were considered simultaneously. One-way analysis of variance was conducted to test for curvilinear relationships and error in measurement between occupation and the attitude scale.

Respondents had only slightly favorable attitudes towards technology as indicated by the mean score for the aggregated scale. The response frequencies of the individual attitude scale items showed considerable variations in the respondents' attitudes towards technology. This variation permitted the test of the theoretical perspective. Selection of possible differentiating, explanatory factors of this variation was based on the utilitarianism-based social exchange theoretical perspective.

The research findings did not support the theoretical perspective developed for this study. None of the investment variables was significantly related with the attitude towards technology. This means that differences in attitude towards technology cannot be explained using the variables selected for study.

Six alternative factors which appeared to represent other dimensions of the model and were available for analysis were selected for supplemental analyses. These variables included health status, income, job satisfaction,
job skills, type of company which employs individuals, and potential employment of other family members (specifically children) when they reach 18 years of age. Pearson product-moment correlation analysis was used to test the strength and direction of the relationship between each of three of the alternate independent variables (health status, income, and job satisfaction) and the dependent variable (attitude towards technology scale). One-way analysis of variance was used to assess the relationship between each of three of the alternate variables (job skills, type of company, and potential local employment) and the dependent variable.

Neither health status, job skills, local employment for children, nor type of company were significant in explaining variability in attitude towards technology. Income and job satisfaction had significant relationships with the attitude towards technology scale, but these findings had little substantive meaning because the strengths of the associations between each of these variables and the attitude towards technology variable were negligible. The supplemental research findings were not useful in explaining variance in attitude towards technology.

Discussion of the Theoretical Model and the Findings

The utilitarianism-based social exchange theoretical framework developed for this research collapsed under empirical investigation. It was posited that individuals
with more appropriate investments vis-a-vis technology should have more favorable attitudes towards technology because they will anticipate receiving more benefits from the introduction of more complex technologies.

The research findings did not provide support for the theoretical model developed in this study. The hypothesized effects of age, employment status, length of residence, occupational status, and education, designated as investments, were repudiated by the multiple correlation and regression analyses findings. One-way analyses of variance were used to test for measurement error and curvilinear relationships between occupation and the attitude scale and between employment status and the attitude scale. The results of these one-way analyses of variance further supported rejection of the hypotheses. These findings indicate that there was random variance operating among the predictive variables.

Retaining the utilitarianism-based social exchange theoretical framework developed for this research, six alternate variables which appeared to represent other dimensions of the social exchange model and were available for analysis were selected for supplemental analyses. These alternate variables included health status, income, job satisfaction, job skills, local employment potential, and type of company. The hypothesized effects of health status were not supported by the Pearson product-moment correlation
analysis. The results of the one-way analyses of variance did not support the hypothesized effects of job skills, local employment potential, and type of company upon attitude towards technology. The hypothesized effects of income and job satisfaction upon the attitude towards technology were supported by the research findings. These findings, however, have little substantive meaning because the strengths of the associations, as measured by Pearson product moment correlation coefficients squared, were negligible. The supplemental analyses were not useful in explaining variance in attitude towards technology. It may be concluded from this supplemental evidence that random variance was operating among four of the six selected alternative predictive variables and that the two variables which were significantly related to attitude towards technology explained only miniscule variation.

Based on the literature reviewed for this study, it was anticipated that although individuals' attitudes towards technology would vary significantly according to the appropriateness of their investments vis-a-vis technology, the level of support for technology would tend to be generally high. That is, people would have highly favorable attitudes towards technology, but there would be significant variation within this high level of support. The literature reviewed suggested that this high level of support for technology would be based on the belief that technology is the
means whereby growth and progress have been, and will con­tinue to be, secured. It was suggested that the likelihood of individual-level profits, as well as community and/or societal-level profits, would combine to create overall highly favorable attitudes towards technology. The results of this research effort indicate that, counter to the antici­pated high level of support for technology as measured by the ten-item Likert-type attitude towards technology scale, the respondents had generally neutral, to very slightly favorable, attitudes towards technology. On the aggregate level, the mean score for the attitude towards technology scale was 34.55. An aggregate-level mean score of 34.55 on the Likert-type scale developed for this study falls only mid-way between "undecided" (30) and "favorable" (40).

The major findings of this study may be summarized as follows: (1) The study population expressed neutral, though slightly favorable, attitudes towards technology as measured by a ten-item Likert-type attitude scale; (2) None of the following sociodemographic variables, designated as invest­ments, explained any significant amount of variance in attitude towards technology: age, employment status, length of residence, occupational status, education, health status, job skills, local employment potential, and type of company; (3) Income and job satisfaction had significant relation­ships with the attitude towards technology scale score, but these findings have little substantive meaning because the
strengths of the associations between each of these two variables and the attitude towards technology were negligible.

The relatively neutral aggregate mean score on the attitude towards technology scale suggests that the study population may be expressing some reservations about a wholesale, unquestioning acceptance of a commitment to technology as the main driving mechanism of growth and progress. This does not mean, however, that the technology-driven growth ethos is being rejected. Neutrality simply cannot be equated with rejection. Rather, these data seem to indicate a cautious, though positive, commitment to technology. It would seem that the commitment to growth and progress, as detailed in the literature review, remains intact, but that there may be reservations about an unchecked, unquestioned introduction of more complex technology in industry and lives in general. This cautiously positive attitude towards technology seems to suggest that people may be taking some initiative in examining and evaluating technological advancements more closely before accepting or rejecting the technology. This may indicate a degree of caution concerning what technologies people will accept. On the surface, at least, this seems to run counter to the literature reviewed. However, at its base the utilitarian model is an evaluative, questioning, and experimental one. The cautiously positive attitude towards technology seems to indicate that people
might be practicing some of the basic tenets of utilitarianism before deciding whether to adopt or not to adopt newer, more complex technologies.

The failure of all but two of the sociodemographic variables to predict attitude towards technology indicates that conditions or factors other than sociodemographic ones must be considered if variance in attitude towards technology is to be explained. In short, this finding indicates that attitude towards technology cannot be predicted solely with sociodemographic variables. This finding appears to run counter to the adoption and diffusion literature. Based on numerous studies of the diffusion process a social and personal characteristics profile of early adopters of new ideas and/or technologies has been compiled. These studies have consistently shown that, among other characteristics, early adopters of new technology and/or ideas tend to be younger, to have higher socioeconomic status, to have more years of formal education, and to come from more long-term resident families, than those who are late adopters (Bohlen, 1964:276-281; Rogers and Burdge, 1972:358). It must be recognized that the diffusion and adoption studies focused attention on decision-making involving a specific technology with known effects, e.g., hybrid seed corn, an improved farming practice, and so on. This research effort, on the other hand, has focused attention on attitude towards an undifferentiated technology and unspecified effects.
Although the questions addressed by the diffusion/adoption studies and this study are different, it had been anticipated that the early adopter profile would be predictive of attitude towards technology in general. It was reasoned that persons with early adopter characteristics would, in turn, have more favorable attitudes towards technology in general. The failure of the sociodemographic characteristics to be predictive of attitude towards technology causes several interesting questions to come to the fore. These questions will be addressed in the next section.

Implications for Further Research

Because the sociodemographic variables failed as predictors of attitude towards technology and because the study population expressed cautiously positive attitudes towards technology, several interesting questions requiring additional research emerge. The evidence indicated, first, that factors other than sociodemographic ones must be considered if any significant amount of variability is to be explained in attitude towards technology. It should be recalled that, in the context of the utilitarianism-based social exchange theoretical orientation developed for this research, the sociodemographic variables represented investments, i.e., qualities individuals bring to a situation. It was reasoned that persons bringing more appropriate investments to an exchange situation involving the introduction of more
complex technology would have more favorable attitudes towards technology because their investments would likely enable them to secure more benefits. In short, the sociodemographic variables in this study functioned as substitute (or "proxy") variables for direct benefits and costs that individuals might incur vis-a-vis technology. The evidence indicates that these sociodemographic variables apparently were not indicative of perceived benefits and costs. An area for further research, then, would be to develop a set of variables that might more closely measure the direct costs and benefits of technology. Suggested categories of indicators of direct costs and benefits include measures of individuals' most recent exposures to technology, measures of individuals' most recent experiences with technology, and measures of individuals' awareness of technology. As can be recognized, all of these suggested measures are at the individual or micro level of measurement.

Another question requiring further research involves testing the social exchange theoretical orientation developed for this study with issue-specific technology rather than with undifferentiated technology. The types of technology might not need to be as specific as in the bulk of the diffusion and adoption literature, e.g., a single practice, but could address a category of technology, e.g., computers, nuclear technology, waste disposal, and so on. It is suggested that this technology-specific approach
could be adequately addressed using the theoretical model developed in this study.

Because the subject of the human/technology interface is such a timely one, sound evidence gathered in a systematic manner should be continued. Questions involving the human/technology interface are being asked more and more in everyday life as the hardware reality of technology becomes a major factor in modern man's life.
LIST OF REFERENCES


