1991

Entry Strategy Performance: An Empirical Examination Of The Microcomputer Software Industry

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ENTRY STRATEGY PERFORMANCE:

AN EMPIRICAL EXAMINATION OF THE MICROCOMPUTER SOFTWARE INDUSTRY

by

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Submitted in partial fulfilment
of the requirements for the degree of
Doctor of Philosophy

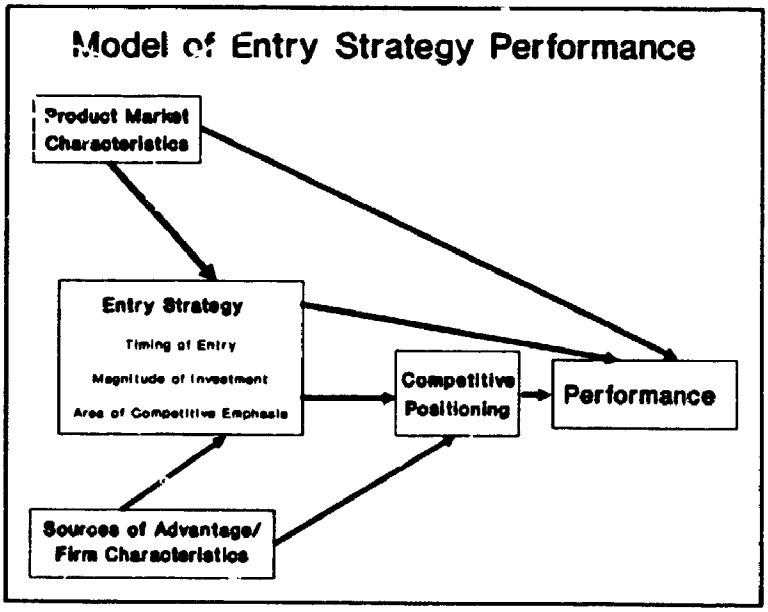
Faculty of Graduate Studies
The University of Western Ontario
London, Ontario
December, 1991

ISBN 0-315-71983-4

ABSTRACT

Statement of Problem: Not only is it expensive to bring products to market, but the rate of failure for new entries is high. Managers and researchers recognize that many factors affect the performance of a new entry, but most prior research has examined each construct one at a time using different measures for the constructs involved. These activities have contributed to the inconsistent findings.

Procedure or Methods: A model of entry strategy performance is developed from prior research (see Figure). An entry strategy affects both the short and long term performance of the product as it establishes the product's initial competitive posture. Entry strategies are comprised of three fundamental components or decision areas: timing of entry (when to enter the market), magnitude of investment (in terms of R&D, promotional activities, distribution, etc.), and area of competitive emphasis. Other factors, outside the immediate control of management, affect a product's success or failure. They affect not only the performance of the new entrant but also the selection of the entry strategy itself. These are included in the general model (see Figure).



This model is then operationalized and empirically examined in two product markets in the microcomputer software industry: word processing and business graphics. Analysis of the model is done via partial least squares analysis.

Results: All of the paths in the operationalized model were significant in one or both of the product markets. The most important predictors/explainers of performance were magazine coverage of the products (an industry specific construct added to the general model), competitive positioning dimensions: quality and value, and timing of entry. The weakest effects on performance came from the product market constructs: concentration and number of competitors.

Conclusion: The major contribution of this research is the development and testing of a comprehensive model of entry performance. It can be used as a decision-making aid for managers and as a general guide to researchers into entry strategies.

DEDICATION

This work is dedicated to my best friend, my partner, my spouse:

Milford B. Green

His unwavering support throughout the years enabled me to pursue my dream of being a doctor, too.

ACKNOWLEDGEMENTS

My work in the research and writing of this dissertation could not have been done alone. In this section I want briefly to acknowledge the encouragement and strength I received from others, especially: my advisors, my family and other supporters.

My most heartfelt thanks go to my advisor, Adrian B. Ryans. His guidance and support are much appreciated. Although always busy, Dr. Ryans never once said he was too occupied to discuss my research, to read my latest work or to provide counsel. At every stage in the dissertation process his interest in my research stimulated me to do more than I had initially planned and to do it better.

Don Barclay introduced me to the world of second generation data analysis techniques. His teaching and coaching gave me the skills necessary to tackle the investigation of entry strategies as I felt they should be investigated. Dr. Barclay also never made me feel as though I was imposing on his time. He was willing to entertain my questions and provided encouragement when I needed it most. His thoughtful suggestions throughout the development of this dissertation helped to make it a better product.

During my first summer at the University of Western Ontario Michael Pearce guided me into the world of marketing research and case writing. Over the years Dr. Pearce has encouraged me in my doctoral studies, while acknowledging that doctoral students have personal lives too. Finally, I'd like to thank him for reviewing my dissertation and providing me with valuable feedback.

None of my family doubted that one day I would finish my Ph.D. My parents were especially helpful by tacitly acknowledging that I could be whatever I wanted to be. It just took a long time to decide what I wanted to be.

My husband's role in this process was invaluable. During my days in an M.B.A. program we shared his professor's office. Observing his role inspired me to pursue a doctoral degree. During my years in the program he not only provided us with a financial base, but he also provided much needed encouragement for me to get on with the process. (As my biological clock began ticking away, and still no degree in sight.) He shared parenting responsibilities--and even became the in-town parent once I began teaching. It has been great being able to share the trials and tribulations of the doctoral student indoctrination process with one who really understood and cared what I was going through.

My son also deserves many thanks. Dexter came into the world two days before I was scheduled to defend my dissertation proposal; through his entire life so far I have been pursuing my dissertation. His smile, warmth, and need for play provide me with recharged batteries and an incentive for completing my work.

Finally, I'd like to thank all those helpful individuals and companies who either provided data or helped me to get access to data. Walter Zimmerman, at the University of Western Ontario's D.B. Weldon library, is a wizard when it comes to searching online databases. His expertise saved me time and money for online search charges. Merran Neville, at the University of Western Ontario's Computing Services Library, allowed me months of access to back issues of microcomputer magazines.

Ed McBride of Software Magazine allowed me access to their Software Market Surveys. His generosity allowed measurement of concentration ratios and market share performance measures.

I want to thank many others both within the microcomputer software industry and associated with the microcomputer industry (e.g. consultants, magazine publishers, associations) for providing me with information and leads for more information.

Finally, money is always a very important matter to doctoral students and it often runs low before a degree is completed. When money was most needed I received two awards for my dissertation proposal. I would like to thank the Marketing Science Institute for recognizing me with an award in the 1989 Alden G. Clayton Doctoral Dissertation Proposal Competition and the National Centre for Management Research and Development for a 1989 Doctoral Fellowship. Finally, I want to thank my colleagues at the University of Windsor for being supportive as I finished my degree.

TABLE OF CONTENTS

CERTIFICATE OF EXAMINATION ii
ABSTRACT iii
DEDICATION v
ACKNOWLEDGEMENTS vi
TABLE OF CONTENTS ix
LIST OF TABLES xiv
LIST OF FIGURES xv

CHAPTER ONE: INTRODUCTION 1
Research Needs 3
Summary of Dissertation Research 4
Entry Strategy Performance Model 5
What is an entry strategy? 5
What other factors may impact on the success of an entry strategy? 6

CHAPTER TWO: LITERATURE REVIEW 9
Entry Strategy Performance Model 9
Literature Review 13
Entry Strategy: Timing 17
Entry Strategy: Magnitude of Investment 28
Entry Strategy: Competitive Advantage/Competitive Positioning 30
Prior Entry Experience 36
Industry Structure/Product Market Characteristics . . . 38
Concentration 41
Growth Rate 43
Number of Competitors 44
Potential Market Size 44
Integrative Studies 45
Conclusion: Review of Gaps in Literature/Research Needs . . 53
Lack of Integration of Concepts/Research Methodology . 54
Type of Data Set 54

CHAPTER THREE: RESEARCH DESIGN 57
Overview 57
Construct Measurement in the Entry Strategy Performance Model 57
Entry Strategy 58
Prior Entry Experience/Sources of Advantage/Company Characteristics 60
Product-market Characteristics 61
Performance 62
Research Design 62
Data Set and Methodology: Archival Study of the Micro-computer Software Industry 62
Suitability of Chosen Product Market 62
Data Collection: Measures and Methodology . . . 65
Product market Definition/Product market(s) to Study 68
Choice of Operating System 69
Choice of Software Categories to Study 71
Definition of Product market and Choice of Product market(s) 71
Analysis Technique: Causal Modeling: Partial Least Squares 77

Number of Cases Required for PLS Analysis 81
Appropriate Sample Size 81
Examples of PLS analyses with a small sample size 81
How small is small?/Is the sample size large enough? 82
Can the necessary sample size be determined prior to estimation? 83
Word Processing Sample Size 87
Conclusion 87

CHAPTER FOUR: OPERATIONALIZATION IN THE SOFTWARE INDUSTRY 88
Measurement Issues 88
Date for the Performance Measure 88
Entry Period 93
What is a New Product? 95
Multiple Entries by the Same Firm 97
Choice of Specific Products in Product Market(s) Studied 98
What Measures Should be Used for the First Entrant? . . 100
Research Model in the Microcomputer Software Industry 102
Data/Sources for Each Construct and Its Measures 107
Performance 108
Competitive Positioning 112
Word Processing Reviews 112
Competitive Positioning: Pricing 112
Price: Relative Retail Price 112
Price: Relative Minimum Price 113
Price: Discounted Price 114
Competitive Positioning: Quality: Features and Editor's Choice 114
Quality: Editor's Choice 116
Quality: Relative Number of Features 117
Copy Protection 117
Compatibility: Hardware Support 119
Compatibility: Products 119
User Friendliness 120
Timing of Entry 120
Sources of Advantage 123
Human Capital 124
Capital Base 124
The Data for the Sources of Advantage Construct . 125
Prior Entry Experience 126
Magnitude of Investment 128
Magnitude of Investment: Advertising 129
Magnitude of Investment: Distribution 131
Product Market Characteristics: Number of Active Competitors 134
Product-market Characteristics: Potential Market Size 134
Product-market Characteristics: Concentration Ratio . 134
Product-market Characteristics: Growth Rate 135
Magazine Coverage 135
Software Reviews and Citations 136
Summary of Research Model 138

CHAPTER FIVE: DATA ANALYSIS AND DISCUSSION OF RESULTS 140
Introduction 140
Data Collection 140
Structural Equation Modeling 140
PLS Modeling Results 141
Model Specification and Evolution 142
Original Research Model 142
Preliminary Measurement Model 143
Revised Research Model 152
Measurement Model Evaluation 153
Content Validity 155
Reliability 156
Average Variance Extracted 157
Convergent and Discriminant Validity 158
Summary of Measurement Assessment 159
Structural Model Evaluation 159
Timing 160
Magnitude of Investment 161
Competitive Positioning 163
Prior Entry Experience 164
Company Characteristics / Sources of Advantage . 164
Industry / Product Market Conditions 166
Evaluation of Overall Model 170
Sample Size 170
Overall Model Evaluation: Predictive Relevance . 170
R-Square 170
Stone-Geisser's Test of Predictive Relevance . . 171
Discussion of Results 172

CHAPTER SIX: ENTRY STRATEGY PERFORMANCE IN THE BUSINESS GRAPHICS PRODUCT MARKET 174
Similarities and Differences in the Two Product Markets . . . 175
Similarities Between the Graphics and the Word Processing Product Markets 175
Differences Between the Graphics and the Word Processing Product Markets 176
Operationalization in the Business Graphics Product Market . 178
Definition of Business Graphics Product Market and Selection of Cases 178
Multiple Product Entries from the Same Firm 178
Date for the Performance Measure 180
Entry Period Determination 180
Data/Sources for Each Construct and Its Measures . . . 181
Performance 182
Competitive Positioning: Pricing 183
Competitive Positioning: Quality, etc. 183
Timing 184
Sources of Advantage 184
Magnitude of Investment: Advertising 185
Magnitude of Investment: Distribution 185
Product Market Characteristics: Number of Competitors 185
Product Market Characteristics: Concentration Ratio 185
Magazine Coverage 186

Data Analysis and Discussion of Results 186
Measurement Model Evaluation: Preliminary Measurement Model 186
Number of Active Competitors 186
Distribution Investment 186
Pricing 188
Magazine Coverage 189
Measurement Model Evaluation: Reliability and Validity 189
Structural Model Evaluation 192
Timing 192
Magnitude of Investment 194
Competitive Positioning 196
Company Characteristics / Sources of Advantage . 197
Industry / Product Market Conditions 199
Summary 201
Evaluation of Overall Model 201
R-Square 201
Stone-Geisser's Test of Predictive Relevance . . 202
Discussion of Results 202
Sample Size 202
Substantive Results 202

CHAPTER SEVEN: IMPLICATIONS AND CONCLUSIONS 204
Research Contributions 204
Definition of Entry Strategy 204
Development of Overall Model of Entry Strategy Performance 205
Operationalization of the Entry Strategy Performance Model 205
Use of Archival Data Sources 206
Empirical Test of the Entry Strategy Performance Model 208
Summary of Findings 208
Product Market Specific 208
Entry Strategy Components 210
Other Constructs in Entry Strategy Performance Model . 213
Research Limitations 214
Constructs in Model 214
Main Effects Model 214
Weak Findings for Product-market Characteristics 215
Distribution Investment Measures Weak 215
Research Design 215
Interim Changes in Competitive Positioning . . . 215
Related Product Markets 216
Data Analysis 216
Implications 217
Implications for entry theory and research 217
Implications for managers 219
Implications for managers in the software industry . . 221
Conclusion 224

APPENDIX 225
Data Collection Process for Dissertation 226
Data Coding/Computations Prior to PLS Analysis 228
Technical Information About Partial Least Squares Analysis . 229
Formative or Reflective Indicators 229
Formulae for Reliabilities and Average Variance Explained 231
Single Measure Reliabilities 232
Composite Reliability for each Construct 232
Average Variance Extracted 232
Correlation Results Comparisons: Between Measures Versus Between Latent Constructs 233
Correlations Between Latent Variables 235
Word Processing: LV correlation matrix 235
Business Graphics: LV correlation matrix 235
Correlations Between Manifest Variables and Their Constructs 236
Word Processing 236
Business Graphics 239

BIBLIOGRAPHY 244

VITA 250

LIST OF FIGURES

Figure 1.1 Entry Strategy Leads to Performance 1
Figure 1.2 'Basic' Entry Strategy Performance Model 2
Figure 1.3 Entry Strategy Performance Model -- Entry Strategy Expanded 5
Figure 1.4 General Framework of Entry Strategy and Performance . . 8

Figure 2.1 Operationalization of Entry Strategy 13
Figure 2.2 Conceptual Model of Entry Strategy Performance 14
Figure 2.3 The Elements of Competitive Advantage 31
Figure 2.4 Schematic of Carpenter's Structural-Equation Model . . 49

Figure 4.1 Word Processing Market Shares 1982 through 1988 90
Figure 4.2 Establishment of Entry Period 94
Figure 4.3 Entry Strategy Performance Model in the Microcomputer Software Industry 103
Figure 4.4 The Entry Strategy Performance Research Model for the Microcomputer Software Industry 104
Figure 4.5 Performance Measures for Word Processing 109
Figure 4.6 Competitive Positioning: Pricing 113
Figure 4.7 Competitive Positioning: Quality and Features 115
Figure 4.8 Timing of Entry 122
Figure 4.9 Comparison of the Timing Measurement Scales 123
Figure 4.10 Sources of Advantage 124
Figure 4.11 Prior Entry Experience 126
Figure 4.12 Magnitude of Investment: Advertising 131
Figure 4.13 Magnitude of Investment: Distribution 133
Figure 4.14 Number of Active Competitors 134
Figure 4.15 Concentration 135
Figure 4.16 Magazine Coverage 137

Figure 5.1 Entry Strategy Performance Model for the Microcomputer Software Industry: Research Model 144
Figure 5.2 Number of Competitors Measurement Scales 150
Figure 5.3 Entry Strategy Performance Model for the Microcomputer Software Industry: Research Model 153
Figure 5.4 The Structural Model: Path Coefficients and t-values. 161
Figure 5.5 Yearly Concentration in the Word Processing Market . . 167

Figure 6.1 Graphics: Entry Period Determination 181
Figure 6.2 Entry Strategy Performance Model in the Microcomputer Software Industry 182
Figure 6.3 The Structural Model: Path Coefficients and t-values for the Graphics Product Market. 193

Figure 7.1 Summary of Research Results: Word Processing and Business Graphics Product Markets 209
Figure 7.2 Volume of Advertising During Entry Period 211
Figure 7.3 Entry Strategy Performance Research Model 218
Figure 7.4 Entry Strategy Performance Model Managerial Model . . . 220

Figure A.1 Formative or Reflective Indicators 229

LIST OF TABLES

Table 2.1 'Models' About Entry Strategies 18
Table 2.1 (continued) 'Models' About Entry Strategies 19
Table 2.2 Studies Involving Strategy 35
Table 2.3 Industry Structure 42
Table 2.3 (continued) Industry Structure 43

Table 3.1 Entry Performance Model Generic Construct Measures . . . 58
Table 3.2 Microcomputer Software Categories 72
Table 3.3 Number of Cases Required for Prior PLS Studies 86

Table 4.1 Top 20 Publications: Software Advertising Pages 130
Table 4.2 Constructs and Measures 139

Table 5.1 Measurement Model 145
Table 5.1 (continued) Measurement Model 146
Table 5.2 Revised Measurement Model 154
Table 5.2 (Continued) Revised Measurement Model 155
Table 5.3 Results of PLS Modeling: Revised Model 160

Table 6.1 Graphics Measurement Model (Comparable to Table 5.1 for the Word Processing Product Market) 187
Table 6.1 (continued) Graphics Measurement Model 188
Table 6.2 Revised Graphics Measurement Model 190
Table 6.2 (continued) Revised Graphics Measurement Model 191
Table 6.3 Results of PLS Modeling: Revised Graphics Model 192

Table A.1 Steps of Data Collection 226
Table A.1 (continued) Steps of Data Collection 227
Table A.2 Data Coding/Computations Prior to PLS Analysis 228
Table A.3 Choice Criteria for Formative or Reflective Indicators; Relationship Between Observables and Data 231
Table A.4 Comparison of Results: Single Variate Hypotheses Versus PLS Results 234
Table A.5 Descriptive Statistics (Word Processing) 242
Table A.6 Descriptive Statistics (Graphics) 243

CHAPTER ONE
INTRODUCTION

> Entering a new market with a new product is extremely dangerous to begin with but entering the market improperly may be the kiss-of-death for many companies... (Samli and Wills 1986, p. 30)

Failures of new products and new firms (with their new products) are high. In the last ten years fewer than 200 product introductions resulted in more than $15 million in sales. Of those only a handful produced more than $100 million in sales (Achenbaum 1989). Although Achenbaum suggests four reasons for this dismal success record[1], all four really point to one failure: the lack of a well-planned entry strategy for new products.

The introduction of new products is an activity that every firm will undertake at least once in its lifetime. If it wants to grow and expand, a firm, even if it begins with only one product, will introduce that product to new markets (a new entry) or will introduce other new products to a single or multiple markets. A firm's success is dependent on the success of these new product entries. The strategy a firm chooses to enter a market (or lets happen by neglect) affects its performance in that market (Figure 1.1). Making appropriate entry strategy decisions is, therefore, vital to all firms.

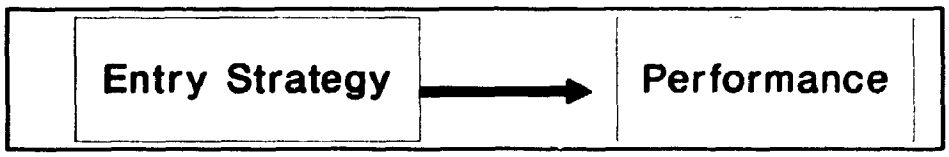


Figure 1.1 Entry Strategy Leads to Performance

A new entry is the introduction of a firm's product into a market where the product has not been previously sold. This definition of entry includes 1) a firm introducing an old product into a new market (e.g.,

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[1] 1. Get lots of products to the market 2. Match with company's marketing or production competencies 3. Incomplete strategic research. 4. Take the product to market as soon as possible.

exports), 2) a new product in an old market, and 3) a new firm first entering a market with its product.

Managers, intentionally or inadvertently, make strategic entry decisions which impact the initial positioning of the new entry. These initial strategy decisions, and the resulting competitive positioning that they create, affect the long-run success or failure of a product (Figure 1.2). Changes and refinements are possible after an entry, but it is

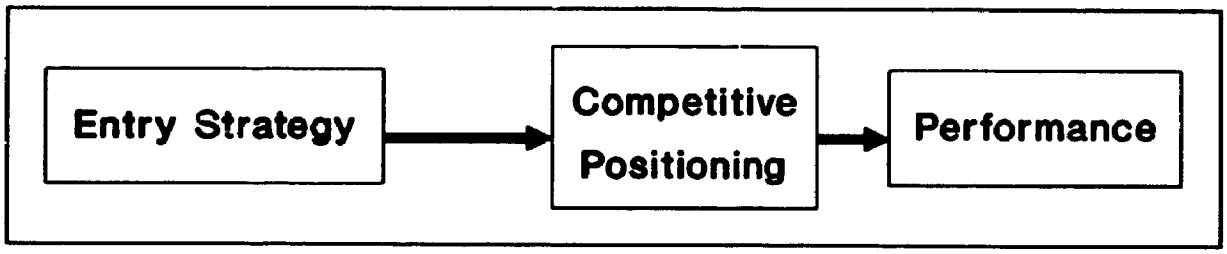

Figure 1.2 'Basic' Entry Strategy Performance Model

generally more difficult to change an established positioning than it is to create new ones. The initial images projected by a product carry over in the minds of customers. Considerable effort must be made to change these images. It is, therefore, important that firms begin with an entry strategy that has positive carryover effects. That is, the initial entry strategy must set up a competitive posture that will enhance the long-run performance of the product.

Performance is used throughout this dissertation to describe what happens to the product after entry into a market. Performance may be measured, depending upon management's objectives, in terms of user satisfaction, market acceptance, sales, market share, or profitability. The better a product's achievements, the more successful the product. Poor product performance may be considered a failure.

Research Needs

Research in marketing and management strives to be relevant to business needs. As discussed above, the successful entries of new products are important to all firms. Naively then, one would expect a lot of research to have been published in this area. Unfortunately for managers, this is not so. There are several reasons for this lack of research. First, there is no clear consensus in the literature as to what constitutes an entry strategy. Many empirical studies examine one or more aspects of an entry strategy (e.g., timing, investment). Few examine more than one. Second, many other factors may impact the success of a product. Examples include: competencies, resources, experience of the companies, and product-market characteristics. Besides those factors that affect entry performance at the time of entry, many other events occur after entry and before the measurement of success. These factors make isolation of the effects of an entry strategy on performance difficult.

This dissertation attempts to overcome some of the obstacles facing entry strategy researchers. Most empirical entry research examines only one construct in isolation and attempts to relate performance to that construct. Recent research has suggested the need for a more integrative approach. Researchers have begun to incorporate two or more concepts in their research and have attempted to integrate concepts related to entry (Sandberg 1984, Smith 1985, McDougall 1987, Gatignon et. al 1990). They have found that many bi-variate relationships are modified or changed when considered with other constructs.

Although a model of entry strategy and performance is clearly needed to guide researchers and managers, unfortunately the methodologies and data sets used in prior empirical entry studies would not allow the testing of such a model. The use of a causal modeling technique such as LISREL or PLS would enable the researcher to examine the relationships between each of the constructs and performance. One study has used causal

modeling in a study of entry into the Vodite market of the MARKSTRAT simulation (Green and Ryans, 1990).

The most common data sets used to study entry are either a few case studies (Bevan 1974, Sandberg 1986) or the PIMS database (Biggadike 1976, Yip 1982, Smith 1985, Robinson & Fornell 1985, Carpenter 1987, MacMillan & Day 1987, and Robinson 1988). Both limit the researcher in his study of entry performance. The use of case studies, although generally producing very rich data, limits the statistical analysis and generalizations that can be gleaned from the data. Cross-sectional data sets such as PIMS limit the researcher to studying only the constructs measured by someone else, with measurements taken at convenient time periods, with comparisons across very different industries, and with selected companies which have chosen to participate.

Summary of Dissertation Research

In this dissertation an integrated framework of entry strategy and performance is developed and tested. This model of entry strategy performance has been developed from both the decision-making needs of managers and the diverse literature related to entry. The constructs included in the model have been considered major factors affecting performance and all have been used in some respect in empirical studies of entry. It is a general model that can be used by both researchers and managers.

To test the entry strategy performance model, a data set from one or more industries was required to allow the examination of complete entry strategies and performance. The word processing and business graphics product markets in the microcomputer software industry were chosen for study. The microcomputer software industry has quickly grown and matured with a lot of available archival data. It was, therefore, possible to develop a data set and to operationalize all the constructs in the conceptual model of entry strategy and performance. The use of the

Partial Least Squares method of causal modeling allows the examination of the relationships between the constructs in the model and the subsequent performance of products in that industry.

This model is now outlined and discussed in managerial terms. This model includes both the decisions included in an entry strategy and other aspects of the firm and the environment that also may affect the subsequent success of the new entry.

Entry Strategy Performance Model

What is an entry strategy?

The strategic decisions that constitute the entry strategy include the decisions that are irrevocable, that is, the decisions that can only be made once, at or before the initial entry into the market. These decisions set the stage, so to speak, for the lifetime of the product. Management can later try to refine or change the product's positioning, but it must start with what has been established in the initial product entry.

Entry strategies are composed of three main components or decision areas: timing of entry, magnitude of investment in entry, and area of competitive emphasis (Figure 1.3). Timing of entry is the question of **when** is the most appropriate time to enter a market. Is it better to be the first entrant with a new product or a late follower who can improve on the pioneer's offerings after the market has been established?

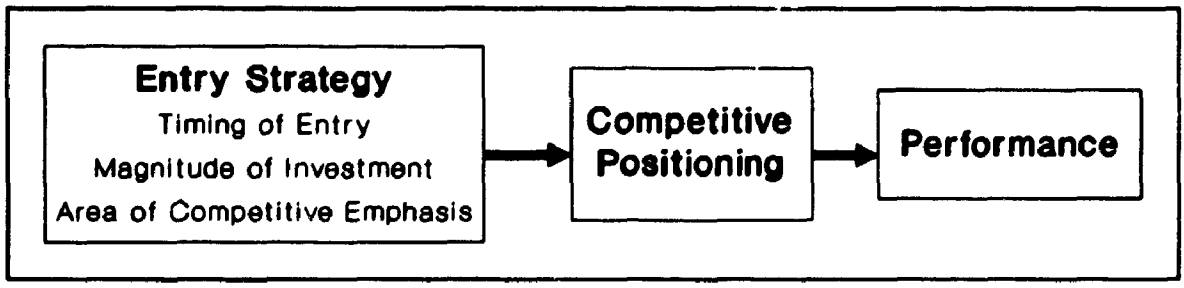

Figure 1.3 Entry Strategy Performance Model -- Entry Strategy Expanded

As a firm enters a market, despite the timing decision or in conjunction with the timing decision, the firm must decide on what scale or what magnitude to enter the market (in terms of R&D, promotional activities, distribution decisions, etc.). The firm establishes its competitive advantage by directing its investments into the areas necessary to develop the desired competitive emphasis.

These decisions constitute the entry strategy. An entry strategy should be designed to create a sustainable competitive advantage for a firm. It is through the selection and establishment of a competitive advantage that a firm can be profitable.

What other factors may impact on the success of an entry strategy?

Entry strategies are not made in isolation. They take place within firms that have particular characteristics and are implemented within product markets that exhibit specific characteristics. These characteristics are, in the short run, fixed. They may affect both the entry strategy chosen by a firm and also the resulting performance of that entry strategy on the product's performance. It will, therefore, be important to measure these characteristics so that the impact of the entry strategy on performance can be ascertained, in conjunction with these other factors.

Firms with prior experience in introducing new products are likely to be more successful than firms with no prior experience. The more related the prior experience, the more likely this experience will translate into better entry strategies for later products. This may partially account for the high failure rate for new ventures with their new products and their new entries. Performance may, therefore, be enhanced because an experienced firm will produce better entry strategies than an inexperienced firm.

Firms also have specific characteristics that can be considered sources of advantages. For example, a firm with access to inexpensive raw

materials could pass the lower costs on to the consumer in terms of lower prices and establish its product as a low-priced product. Another firm may have great technological skills that enable it to produce and position a high quality, superior product.

What constitutes an advantage in a market is related not just to what the firm can do well, but also to what other firms in the product market are doing. It is a product's position relative to other products that determines its competitive advantage in the market. While general industrial organizational economists traditionally examine product-market characteristics, such as concentration ratios and growth rates, marketing and policy strategists look to other factors that may affect success in specific particular product markets. Often called 'key success factors', these influences may vary between industries and within particular segments of product markets. Examples of these firm sources of advantage include: access to retail shelf space, access to raw materials, service, etc.

The inclusion of these external factors leads to the general framework of entry performance shown in Figure 1.4. A conceptual model is developed from this general framework in the next chapter. There is a body of research surrounding each concept in the model. The literature review in the next chapter is organized around the major constructs included in the model. Propositions supported by the literature conclude the discussion of each construct. Chapters Three and Four detail the specific research design. Operationalization of the entry strategy performance model for study in the microcomputer software industry is discussed. An empirical test of this model in the microcomputer software word processing product market is discussed in Chapter Five. Chapter Six replicates the empirical test of the model in the business graphics microcomputer software product market. The final chapter summarizes the results of this study and highlights its contributions and limitations for both managers and researchers.

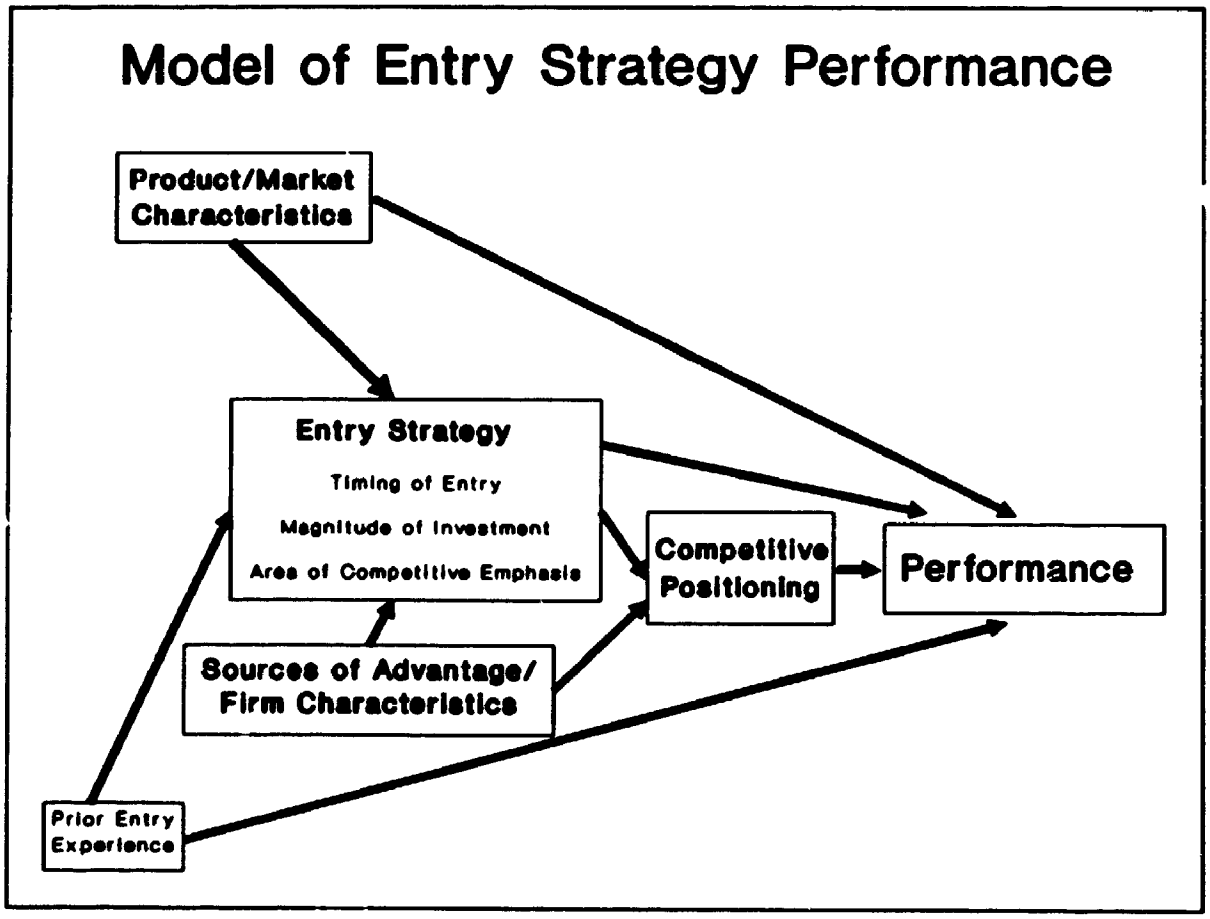

Figure 1.4 General Framework of Entry Strategy and Performance

CHAPTER TWO
LITERATURE REVIEW

> A basic implication emerging from this study is that research on business unit level performance needs to be grounded on a model or theory of performance. ... there is no agreement on distinctions among strategic or environmental factors; one consequence is that every study is based on a different set of assumptions and variables. This makes it difficult to determine whether the differences reported are due to procedure or to a variation in the actual circumstances. Lack of a model also may result in important issues being overlooked (Smith 1985, p. 138).

With this need in mind the author developed such a framework for entry strategies and performance (Figure 1.4). The entry strategy performance model introduced in the last chapter is further developed in the next section. It is redrawn to provide a conceptual framework for the literature review and subsequent analysis.

The literature review is divided into sections. Each section reviews the literature of one of the blocks in the entry strategy performance model (Figure 2.2). At the conclusion of each section are one or more propositions summarizing the expected relationship between the construct and entry performance and/or between the construct(s) and other constructs in the model.

Entry Strategy Performance Model[1]

A new entry is the introduction of a firm's product into a market where the product had not been previously sold. This definition of entry spans the range from a firm introducing an old product into a new market (e.g., exports), to a new product in an old market, to a brand new firm first entering a market with its new product. The success of a firm's new entry is important to the firm both in the short term and the long term.

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[1] Only the primary constructs affecting entry performance are included in this model. This is done 1) to keep the model parsimonious and 2) to keep the model generalizable to all entries.

Entry into a market, and the development of an entry strategy, presuppose the selection of a product market to enter and a decision to enter that market. Product-market characteristics and their possible effects on entry decisions will be discussed separately from entry strategies per se. It should be emphasized, however, that the development of an appropriate or successful entry strategy is dependent upon conditions prevalent both at the time of entry and in the future. Some references to industry characteristics will, therefore, inevitably be made during this discussion of entry strategies. This is also the reason for the inclusion of industry or product-market characteristics in the model of entry performance (See Figure 1.4).

Prior entry experience is another construct which affects the performance of a firm's entry strategy as well as the entry strategy itself. Prior entry experience should lead to higher performance because of either a) established relationships (brand loyalty, access to capital, access to distribution channels, etc.) and established skills (research and development, marketing skills, etc.) (Doutriaux 1988, Hines 1957, McDougall 1987, Yip 1982) or b) learning, which occurred as a direct result of previous entry experience. The first is included in the model in the sources of advantage/firm characteristics component of the entry strategy model. The second is listed separately in the model as "prior entry experience." The more similar the previous entry in terms of either product or product-market characteristics, the greater is the expected impact on a firm's chosen strategy and the resulting performance (see Figure 1.4).

The strategy associated with an entry is the entry strategy. It differs from a marketing strategy, a product strategy, or a business strategy because it includes decisions that only apply during the firm's entry, or critical decisions that are made then. Day (1986) discusses the entry decision and presents questions that management should address when considering entry into a market. The three questions Day poses are 1)

When should we enter (pioneer, fast follower, or late entrant, i.e., timing)? 2) How should we enter (approach via internal development, acquisition, or joint venture; magnitude of participation; and basis of competitive advantage)? 3) What actions should be taken to preempt potential competitors or respond to later entrants? (Day 1986, p. 99)

The conceptualization of entry strategy thus includes three major decision components: timing of entry, magnitude of entry, and area of competitive emphasis. These entry strategy components are directly related to Day's (1986) three questions, but are more general. If management fails to actively consider these decision areas, timing, investment and competitive positioning decisions occur by default, without consideration for their overall impact on entry success.

This literature review summarizes the current state of knowledge in this area. First, a brief explanation of the three key entry strategy decisions follows.

The timing of entry involves the question of when is the most appropriate time to enter a market. Is it better to be the first entrant with a new product or a late follower who can improve on the pioneer's offerings? Sometimes first is best, sometimes late is best. Much empirical research has been devoted to this question. Timing of entry cannot alone explain entry success. Other factors have been identified as important to both the timing decision and performance. These are discussed more fully later.

When a firm decides to enter a market, regardless of the timing decision or in conjunction with the timing decision, the firm also must decide on the scale or the magnitude of the entry. Firms must decide how much they will invest in product development (research and development), advertising, promotion, production, pricing and distribution. In discussions of alternative strategies, these investment decisions are often referred to as the aggressiveness of an entry. An aggressive entrant generally incurs high upfront costs as it uses such tactics as

high advertising and promotional expenditures, low prices (high reverse investment expense as less revenue is being collected), and high quality products. Both Biggadike (1976) and McDougall (1987) say that aggressive versus gradual approaches are appropriate components for consideration in an entry strategy.

The timing decisions and the investment decisions are a part of the complete entry strategy designed to create a sustainable competitive advantage for a firm. It is through the establishment of a competitive advantage that a firm can be profitable long term. This is the third leg of the entry strategy. It is an area where the operationalization of the concepts has made research progress very difficult (Day and Wensley 1988). Much of the research in this area has focused on specific strategies and how well they have worked under specific conditions. It is likely that the reason different strategies work under different conditions is that different competitive advantages are important under different conditions. It is the competitive advantage that is important. That is, given certain conditions, what strategic decisions can a firm take to make its product(s) successful? (Carroll 1982, Day 1988) How can a firm have its product make consumers perceive its product as one that they would purchase? The study of actual strategies (marketing mix, etc.) is important as it sheds light on how a competitive advantage was gained or how it was changed.

Timing, magnitude of investment and area of competitive emphasis are the three primary decisions in an entry strategy. Generally research on these topics, including this dissertation, focusses on the implemented managerial decisions (See Figure 2.1). The managerial framework for entry strategy performance is translated into the conceptual model of entry strategy performance with inclusion of the implemented entry strategy rather than the entry decisions (See Figure 2.2). One other change (from Figure 1.4 to Figure 2.2) is that the path from prior entry experience to the entry strategy was removed. It is likely that prior experience would

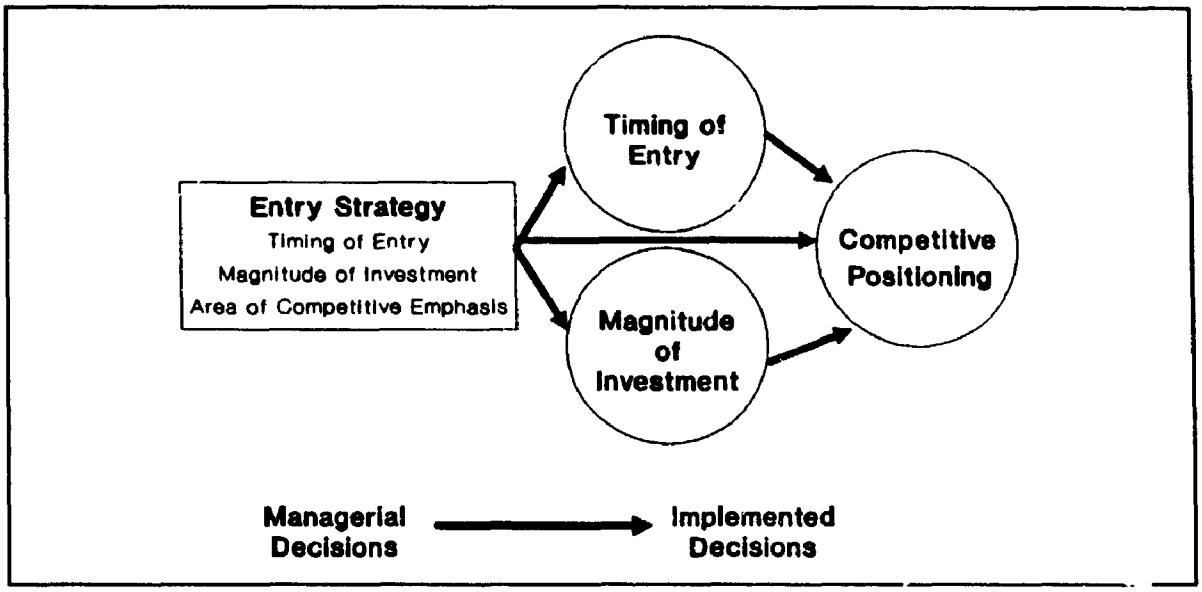

Figure 2.1 Operationalization of Entry Strategy

affect the strategy chosen, but it is not possible to predict a direct relationship between some level of prior experience and the specific strategy chosen. The chosen strategy probably will have more to do with the product-market conditions and the sources of advantage than simply experience. However, experience should enable the firm to make a better decision. It is for this reason that the prior entry experience is hypothesized to affect only the performance of the firm.

In the rest of this chapter a review of the theoretical and empirical research related to entry strategies is discussed. The literature supports the entry strategy performance model shown in Figure 2.2.

Literature Review

The first publication to bring the study of entry behavior into marketing was published by the Marketing Science Institute in 1975. In it Pearce reviewed the economics literature on entry. He divided the literature on entry into four areas: entry conditions ("inducements and obstacles--actual or perceived--which characterize a particular business or set of business, i.e., industry" p. 11), entry decision-making ("corporate determination of whether or not and how to enter a business

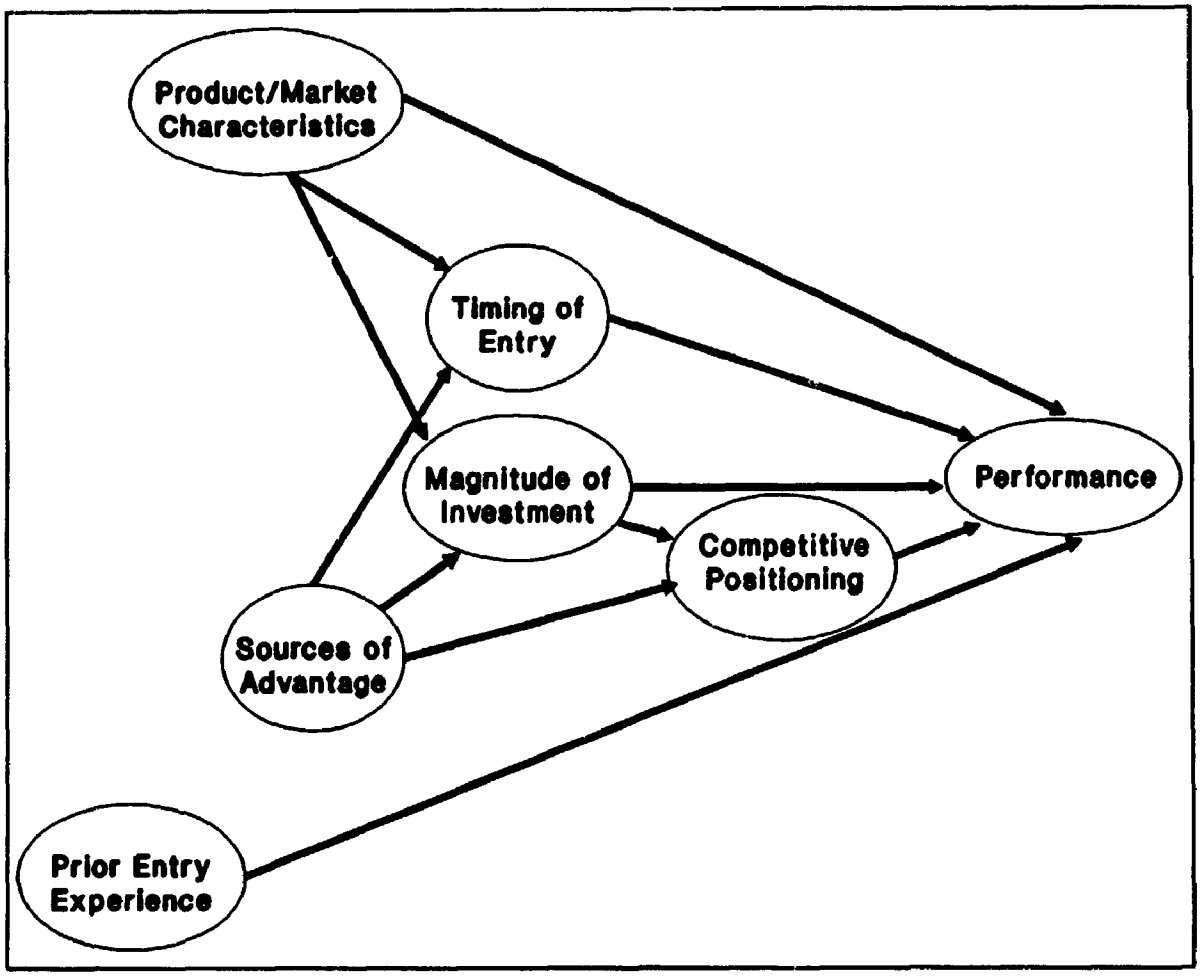

Figure 2.2 Conceptual Model of Entry Strategy Performance

new to the firm" p. 11) , entry behavior ("observable corporate commitment to a new business endeavor, ..the manifested outcome of entry decision-making activities" p. 11) and entry effects ("the impact of actual, anticipated, or impeded entry behavior on (a) structure, conduct, and performance of established sellers in a particular business and (b) the decision-making and behavior of firms outside that particular business who may enter it at some time" p.11). In his review Pearce states, "Currently, almost no work appears to be underway to improve our understanding of entry behavior" (p. 102). Part of the reason for this lack of research was and is the difficulty in obtaining individual firm data. Another major reason is that the individual firm has not been the

main focus of a study in economics. All of the other areas reviewed by Pearce fall within the traditional realm of economists. This dissertation focuses on what Pearce calls entry behavior and its resulting effect on performance. The central focus is not on an entry by a firm to an industry, but on a product entry to a particular product market.

The intention here is not to discard the work of economists but to concentrate on what is of relevance to managers, not to the economy as a whole. The focus is, therefore, not on what discourages new entrants (e.g., barriers to entry), what encourages new entrants (e.g., high potential profitability in the industry), or what the overall good (e.g. pricing level) to consumers is. The focus in the entry strategy performance model is on what contributes to a successful entry. To do this the model incorporates the entry strategy decision of the managers (timing, investment and competitive positioning), the firm's resources, and product-market characteristics. The inclusion of product-market characteristics is an attempt to bring to bear some of the findings the economists have made regarding 'structure' or 'entry conditions', generally at industry-wide levels, to the individual product level. A brief review of industrial organization economics follows to show what is and what is not applicable to this study of entry strategy.

Underlying much of the work of industrial organization economists is the Structure - Conduct - Performance (SCP) paradigm. "The SCP paradigm assumes that certain basic economic conditions such as supply, demand and state of technology lead to specific types of market structure, which in turn influence conduct and so firm or industry performance" (Reekie 1989, p. 57). The structure of the market is basically a measure of the power of firms to influence prices. It is generally measured by some variation of concentration ratios, number of firms, and firm size. The conduct of the firms includes strategies to raise profit levels such as collusive behavior, product differentiation, and erection of barriers to entry. Good performance is generally considered by economists to be technical

efficiency (production at minimum possible average cost) and equity. Firms can also be judged on innovative ability, profitability (although this could also be a measure of monopoly power) and growth (except that this feeds into more concentration) (Reekie 1989).

Except for their discussions of barriers to entry, economists seem mainly concerned with the current market structure and how it affects equity and efficiency via prices and profitability, not the successfulness of a new market entrant. The entries that economists generally refer to are entries into industries, not into specific product markets. Entry success, if considered, is firm performance or firm performance within an industry, not success of particular products. This different focus is the main reason that an extensive review of the industrial organizational literature is not included in this dissertation.

This dissertation is concerned with the success of individual entries into a product market. It is not concerned with the average profit or success levels across industries. The emphasis here is on the manager and the decisions he or she must make as new products enter the market. The economists' focus is more on markets as a whole and whether the vast majority of consumers are receiving goods priced as low as possible. The marketing perspective is that the customers will receive differential values from products with different competitive positioning (product differentiation in economics) and it is important that the marketer or manager be able to recognize what is important for success in a new product entry. Given this focus, one must not exclude market conditions, for as the economists have shown on an aggregate basis, market structure can influence conduct and, in turn, performance.

In the last decade there has been a much stronger recognition in the literature that neither strategy nor industry structure alone is a sufficient explanation for the performance of the firm. Carroll (1982) emphasizes the importance of the actions of an individual firm in determining the firm's performance. He suggests that the

macroenvironmental factors affect the median performance of firms in an industry, while differences in the exploitation of sources of competitive advantage determine the profitability of an individual company. Both the external environmental conditions and the internal strategy and operational decisions affect final firm performance, but neither is an exclusive determinant of behavior and performance. Recent entry studies have attempted to relate both (Table 2.1). Each study focuses on different elements of entry strategy and industry structure. Biggadike, the first researcher to try to integrate these concepts, states: "There is no complete analytical framework developed for studying entry, strategy, and performance; the researcher can therefore create his own" (Biggadike 1976, p. 9).

Since Biggadike's (1976) research, other authors have tried to relate various constructs to entry, strategy, and performance (see Table 2.1). In general, each attempt at integrating the strategy and structure literature has focused on elements of particular interest to the researchers: Biggadike (1976)--relatedness to the parent; Sandberg (1984)--entrepreneurs (plus industry structure and venture strategy); Smith (1985)--marketing strategy (plus timing of entry and environment); and McDougall (1987)--origin of new ventures (plus new venture strategic orientation and barriers to entering a new industry). To date no comprehensive framework has been reported in the literature.

Entry Strategy: Timing

During the last decade marketing researchers have focused increasing attention on the issue of timing. This interest and focus developed out of marketing's association with, and refinement of, the product life cycle concept.

The product life cycle has been well-established and accepted in marketing as important and relevant to strategy decisions. Day (1986) devotes a chapter in his book Analysis for Strategic Market Decisions to

Table 2.1 'Models' About Entry Strategies

Author	Type of Study	Type of New Entrant	Constructs in Model	Findings
Biggadike (1976)	Empirical	Forty new entrants as described by twenty PIMS participants	Relatedness to the parent and market characteristics lead to an entry strategy. Incumbents then react to the strategy resulting in the performance of the venture.	Entire model never tested. Individual questions measuring characteristics of the constructs of interest were discussed. Hard to come to any overall conclusions regarding his 'model'.
Sandberg (1984, 1986)	Empirical	Seventeen new ventures as reported in four venture captitalists' files	New Venture Performance is a function of the characteristics of the entrepreneur, the industry structure, and the venture business strategy	Nonparametric statistics--business strategy and industry structure were related to success, entrepreneur characteristics were not.
Smith (1985)	Empirical	PIMS SPIYR's startup businesses	Performance, marketing strategy, timing, environmental variables	ANOVA: pioneers have a larger market share than nonpioneers.
McDougall (1987)	Empirical	New 'Ventures' in the information processing industry	Performance, strategy types, new venture origins (parentage), entry barriers	Hierarchical linear modelling: strategy plus entry barriers plus interaction is best predictor of performance

Table 2.1 (continued) 'Models' About Entry Strategies

Lambkin (1988)	Empirical Use of population ecology model as a theoretical basis for the study.	One hundred twenty-nine startup businesses from PIMS STR4 and 187 adolescents from PIMS SPI4	Timing, relationship to parent, entry strategy (scale of business at entry: breadth of product line, depth and breadth of market distribution, production capacity), competitive strategy (relative: marketing expenditures, product quality, customer support services, price, manufacturing costs)	Timing: on its own, order of entry is significant (r=.13 in startups and r=.21 with adolescents) The effect is weakened when strategy and structure are included. Two important effects: scale of entry and competitive strategy.
Green & Ryans (1990)	Empirical	Forty-five new entrants into the Vodite market of the MARK-STRAT simulation.	Performance is a function of 1) entry strategy: timing, competitive advantage, magnitude of marketing and R&D investment and 2) industry structure: growth, concentration, market share volatility, strength of competitors and market size	PLS: The paths for timing, magnitude of marketing investment, and competitive advantage were significant. The others were not. It is likely the industry characteristics did not significantly affect behavior because of the limited variability between the 'industries' in the simulation.
Gatignon, Weitz, and Bansal (1990)	Empirical	Sixty-eight new ethical pharmaceuticals	Performance (market share), relative product quality, detailing minutes share, concentration, experience, and firm size	Econometric modeling: detail share, product quality, concentration, and growth & detailing interaction all had significant coefficients.

'strategic issues in life-cycle management'. He summarizes each stage and the conventional strategic prescriptions for each stage of the product life cycle. He points out that these are only broad guidelines as product life cycles are not immutable and inevitable.

Because of the difficulties of managers in applying the product life cycle, it has been relegated to an interesting and important theory of which managers should be aware. They should not base their decisions solely on the application of the product life cycle. Some difficulties in using the product life cycle as a management tool are: 1) the specific product life cycle curve does not necessarily follow the conventional pattern (Rink and Swan 1979), 2) it is difficult to assess in what stage of the product life cycle the firm is currently situated, 3) the product life cycle pattern may be altered by actions taken by competitors in a market, and 4) there are legitimate questions about how to define the product life cycle--around a particular product, a product class, a consumer need, etc. Recent research has moved away from the product life cycle concept toward an emphasis on issues of timing, i.e., first in the market, early follower, late entrant, etc. This is an attempt to make the research more replicable and more relevant to the manager's experience. There are two major issues that the research in the timing area has tried to uncover. First, are there really pioneer advantages--do pioneers do better than later entrants? If so, from what do these advantages accrue?

Both Day (1986) and Lieberman and Montgomery (1988) summarize advantages and disadvantages that accrue to both pioneers (first movers) and later entrants (late movers). The following discussion draws heavily on these two sources.

Pioneer advantages include: 1) preemption of competition--positioning, market segmentation, distributors, scarce resources, etc., 2) leadership reputation, 3) customer loyalty due to high switching costs, 4) proprietary experience effects, 5) a sustainable lead in

technology, and 6) internal effects such as high morale of employees, which may contribute to external success. Schmalensee's research (1982) also suggests that early entrants have product differentiation advantages as well as direct cost savings due to scale and experience.

On the other hand, the pioneers in an emerging industry must overcome many risks.

> In short, the pioneer must be willing to commit a great deal of upfront money--for R&D, identifying key product attributes, building a "primitive" plant, and educating consumers--in hope that the benefits of being the first to market will outweigh the risks of sailing in uncharted waters. These hopes are not always realized (Schnaars 1986, p. 32).

MacDonald (1985) details many uncertainties and risks that pioneers in emerging industries face. "The young firm and its environment are as yet amorphous as to production, market, and the organizational context of the administrative process" (p. 159). This includes no specialized jobs, no specialized tools, no specialized production process, little or no real information about potential demand and necessary expenditures to develop the market. Also, administrative processes are undeveloped. Potential new competitors, i.e., later entrants, could pose a real threat to the new entrant in an emerging industry.

Firms must balance the development of their product with the development of the market to find the appropriate time to enter the market. Kalish and Lilien (1986) point out another risk that a pioneer faces in entering a new market: entering the market prematurely with an underdeveloped product. They included negative feedback in a diffusion model and showed that too early an entry could have a detrimental impact on the entry. They also warn that ". . . a product/technology may sacrifice sales if entry is delayed too long" (Kalish and Lilien 1986, p. 194).

Yoon and Lilien (1985) provide additional empirical support for the 'cautionary' first entry. They developed models to predict the best timing for successful product introductions (over 10% market share). This

was done by examining the relationship (plotting the data, then developing and statistically testing a quadratic function for the original new products and linear and log-linear functions for the reformulated new products) between the market share during the first year of launch and the time lag between the decision to develop the product and the introduction of the new product into the marketplace. They found that for reformulated new products (RFNPs) success decreased monotonically with launch-time delay. The curve for original new products, ORNPs (based on a technological breakthrough), shows a trend of increasing success, then decreasing success as the launch time is delayed. The authors hypothesize that the differences between the success of the two types of new products may reflect differences in product-market situations. ". . . in particular, the market is relatively better developed for RFNPs than for ORNPs; the longer an incremental innovation takes to get to market, the greater its risk of failure due to changing market conditions, competitive response, or further technological advances" (Yoon and Lilien, 1985, p. 141). This is another way of saying that in an emerging market, or in the introductory stage of the product life cycle, risks of failure are high. Timing is crucial to success as there may be an advantage to delaying entry, but not too long or success disappears.

Fast followers and late entrants have the advantage of entering a market already developed where a product need has been established by a pioneer. The follower has a choice of being an imitator, establishing a niche, or leapfrogging the pioneer with a superior product offering. Lieberman and Montgomery (1988) list some key advantages of late entrants:

> Late movers may benefit from: (1) the ability to 'free ride' on first-mover investment, (2) resolution of technological and market uncertainty, (3) technological discontinuities that provide 'gateways' for new entry, and (4) various types of 'incumbent inertia' that make it difficult for the incumbent to adapt to environmental change. These phenomena can reduce, or even completely negate, the net advantage of the incumbent derived from the mechanisms considered previously (p. 47).

As the above discussion suggests, there is no clear advantage to being either a pioneer or a late entrant. Both strategies have their risks and their advantages. It is likely that the appropriate timing of entry for a specific firm is dependent upon many other circumstances such as its competencies, likely competitive reactions, development of sustainable advantages, rapidity of technological and process change in the industry, market development, etc. Many research projects in the last few years have tried to delineate which timing strategy is best. The most prominent of these are discussed next.

The comparison of timing of market entry and competitive survival by Shaw and Shaw (1984) was undertaken in the nylon, polyester, and acrylics markets of Europe. They found that a combination of late entry and low market shares was a common characteristic of the firms that withdrew from the markets.

In their cross sectional study of PIMS businesses in the maturity stage of the product life cycle, Robinson and Fornell (1985) found support for the hypothesis that market pioneering leads to higher long-run market shares. This relationship is especially strong for frequently purchased consumer goods where distribution is crucial. There were two exceptions to this general finding. In industries with intensive advertising, pioneers do not have significantly higher shares. Also, pioneers have lower shares in industries where all or parts of a product line are changed regularly. They also indicated that although pioneers tend to have higher product quality and broader product lines, these ". . . advantages significantly deteriorate over time" (p.315). In other words, Robinson and Fornell's study leads one to the following conclusion. If, a pioneer can lock up sustainable advantages or barriers, such as a distribution network, the pioneer advantages are longlasting. If however, the advantages are not sustainable or may be copied by later entrants, the pioneer may not be able to sustain its initial lead in the market.

Urban, et al. (1986), in a cross-sectional study, found that there was a strong relationship between order of entry and market share for consumer goods brands. Thirty-two percent of the variation in market share was explained by order of entry. Further support for the early entry, large market share performance is given by Ryans (1988). He found that Canadian firms entering the Japanese market early in the product life cycle (for that product in Japan) achieved higher market share than those who entered later in the product life cycle.

Robinson (1988) repeated the 1985 Robinson and Fornell study using the larger sample size then available in the database 584 (versus 371 in 1985) consumer goods sample from PIMS. He also examined the timing issue in industrial goods markets in PIMS. Robinson states:

> ...sources of pioneer advantages are very robust across both consumer and industrial markets. The main differences are related to industry rather than business characteristics. In consumer markets, higher shares are predicted when the product has a low purchase amount, but in industrial markets pioneers tend to benefit as the product's purchase amount increases. In industrial markets, the magnitude of pioneer share rewards relative to late entrants is initially, but not permanently lower than that in consumer markets (Robinson 1988, p. 93).

Four-year old new ventures from the PIMS STR4 dataset were broadly classified as either pioneers or followers (Miller, Gartner, and Wilson 1989). The researchers found that the four-year average market share was higher for the pioneers than for the followers. Although this lends support for the 'early entry makes better success' theory, it is weak support at best. The results may be partially an artifact of measurement. The authors said that they averaged the data describing the venture's first four years on the market to " . . . dampen the problems of noise associated with single-year data and to facilitate integration with other PIMS research, which typically uses averages" (Miller et al. 1989, p. 202). For the key dependent variable this does not make sense. As the authors point out in their executive summary, *true* pioneers start out with a 100% market share, fast followers (pioneers in their classification) also may start out with large market shares. When these early market

shares are averaged with the later ones it is no surprise that the earlier entrants have higher market shares than later entrants.

Other authors, using 'longitudinal' studies of industries rather than cross sectional studies, have found that often pioneers do not maintain a long-run advantage. In fact, many of them fail. The use of cross-sectional data some period after entry may help create a false impression that pioneers are generally more successful than later entrants. It may just be that only the strongest early entrants survive. The poor early entrants do not show up in the data set because their performance was so poor that they went out of business before the cross-sectional data sample was drawn. Glazer's (1985) study of the Iowa newspaper industry during the period 1836-1976 shows this. He found:

> . . . the empirical evidence showed that in markets consisting of two or more firms, the first entrant was more successful than the second. Yet first entrants in general were as likely to fail as second entrants. That is, it appears that first and later entrants earn identical expected profits even though early entrants enjoy strategic or other advantages. My model suggests that competition forces the first entrant to appear at an early stage in the development of a market so that there is a great danger that demand will not increase to the extent predicted. Therefore the market will not reach the necessary critical size in a reasonable time, and the first entrant will fail even before any other firms enter the industry. Later entrants will choose to enter only successful markets which have reached an appreciable size. Their problem is the stiff competition given by earlier entrants. Observers who look only at the performance of early entrants in successful markets will overestimate the advantages of innovation (Glazer 1985, p. 479).

Schnaars (1986) examines the timing of entry in twelve consumer growth markets (industries) and finds:

> No one timing strategy proves best in all instances. Pioneering, early entry, and late entry--each has produced its share of winners and losers. Analysis of case histories for many prominent consumer growth markets during the past few decades show the blanket statements such as "pioneering is best" cannot be supported. Firms possess different competitive strengths that can negate the positions of others and enhance their own. These competitive strengths, in conjunction with vagaries of the marketplace, can dramatically alter the ultimate positions of firms that entered the markets at different times (p. 36).

In another study of industries over time Olleros (1986) finds:

> While new industries and radically new technologies are often perceived as a fast track to wealth, their early records generally offer a rather dismal picture. As we look at the early history of just about any major technology (think, for instance, of automobiles, pneumatic tires, typewriters, television, semiconductors, or genetic engineering), again and again we see industries emerge "over the dead bodies" of their early pioneers. Sure enough, the few that make it, do make it big, but the immense majority die in the attempt. Entry for the small entrepreneurial newcomers seems to be relatively easy at this early stage, but survival is indeed very tough (p. 8).

Using a gross measure of success or failure, remaining in the market or exiting, Lieberman (1989) found that exit was not affected by the timing or order of entry into a product market. The mortality rates did not substantially differ between early entrants (incumbents in this study) and later entrants: 60% versus 66%. This study is significant in that it is the first cross-sectional study not to find that early entry leads to better success.

Olleros attributes the demise of pioneers to three factors: 1) shakeout of smaller firms by larger ones--"when a new industry moves toward maturity, its basic technologies become increasingly standardized and diffused, demand becomes increasingly price-sensitive, and competition becomes increasingly tight and centered on cost reduction. Because of these forces, the industry eventually shifts into a large-scale, capital-intensive mode of operation and, as this happens, the small pioneers that have failed to grow to a certain minimum size either fall by the wayside or are taken over by those firms that did grow fast enough, or by larger, later entrants" (Olleros 1986, p. 8); 2) failure caused by incompetence, e.g., failure to perceive and understand the changes taking place at the marketing end of the business; and 3) burnout caused by a) pioneer externalities in the technology-creation and market-creation process, b) high market uncertainty, and c) high technological uncertainties.

As markets develop and change, customers' expectations and requirements change. These changes have the effect of altering the competitive conditions that exist in an industry. A company that is a

pioneer into a market generally faces a radically different environment than a company that chooses to enter the market much later. The strategies and competitive conditions require change over time (Bartlett and Ghoshal 1987, Schellinck 1983). Firms may be well-suited to enter a market at a particular time, but unless they can either change with the market or establish an enduring product or service, they will likely have poor performance later. This may be one reason why many pioneers fail or do poorly many years after entry. A good entry strategy does not guarantee long-run success. The firm must continually monitor the environment and make appropriate strategic changes or any initial advantages accruing to pioneers may be lost. "Entering a market is one thing; achieving market penetration and ultimately attaining market dominance is something else" (Kotler and Fahey 1985, p. 445).

Any research on entry strategies must be cognizant of these issues. Measures of performance taken many years after entry reveal not only entry strategy success but also successful or unsuccessful strategic adaptations over the years. The basic premise underlying the entry strategy performance model in this dissertation however is that the original entry strategy sets up a firm's competitive positioning, which leads to its long term performance.

The recent literature on the timing issue leads one directly to Smith's conclusions: "Models of performance at the business unit level should now contain a timing variable if the context of interest is market entry" (Smith 1985, p. 150). It is also apparent that timing alone does not determine the performance of a new entrant, but that performance is also dependent on the company's sources of advantage, chosen strategy and industry conditions. All need to be included in any model of entry strategies (See Figure 2.2).

> **Proposition 1:** The earlier the entry, the better the performance. (Shaw and Shaw 1984, Robinson & Fornell, 1985, Yoon

& Lilien 1985, Urban, et al. 1986, Sandberg 1986, Lambkin 1988, Robinson 1988)[2]

This proposition is stated in this manner because the preponderance of published studies supports this directional hypothesis.

Entry Strategy: Magnitude of Investment

The amount of resources committed to the entry strategy per se has not been the focus of much empirical research. It is, however, an important issue. A firm's initial investment in production capabilities, research and development, and marketing expenditures (advertising, pricing, and distribution) can affect the success or failure of a new entry. Too small an investment may relegate an otherwise successful product and strategy to failure. On the other hand, too large an investment or an investment in the wrong area also could pose problems for a new entrant. The importance of financing a 'good' strategy for competitive advantage means it is not just the magnitude of investment that is important, but also what is purchased with that money.

In the entry literature, research has emphasized the distribution decision associated with entry into a foreign market (Anderson & Coughlan 1987). Root (1980) and Walvoord (1983) in their "how to enter foreign markets" treatise emphasize the importance of the entry mode (agents to exporting to licensing to foreign market production) and the subsequent risks and return tradeoffs. Root stresses the point that the heavier the investment in dollars, the heavier the investment in managerial time and resources, and that this too is an important consideration for a firm entering a new market.

Hedland and Kverneland (1985) found some evidence that those Swedish companies that moved directly from agent to manufacturing rather than going first to the intermediate stage of sales subsidiary (greater

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[2] The studies listed in parentheses by each of the hypotheses either theorize about the relationship or have empirically supported these hypotheses.

investment in terms of monetary and managerial resources) achieved better performance in Japan.

Gatignon and Anderson (1987) examined the foreign entry decision in terms of transaction cost analysis. The investment decision varied from minority shareholder to a totally owned manufacturing and selling organization in the foreign country. They also examined the impact of levels of spending in the industries for advertising and research and development. They found that the level of research and development spending had an impact on whether a firm would enter a market alone or with a partner. They also found that advertising had a positive impact on control. These findings indicate that the larger the required magnitude of investment on some strategic dimensions (e.g., advertising), the more likely the firm is to make greater investments in its distribution network for entry.

Roberts and Berry (1985) suggest differing levels of corporate involvement and corporate investment (venture capital to internal developments) depending upon the firm's familiarity with the market factors and technologies or services involved in the product considered.

MacMillan and Day (1987) found, using correlation analysis, that new corporate ventures with high goals made higher relative investments than those with lower goals. They split the sample into high and low groups (above and below the mean). For most of the strategic options studied (plant sizes; relative--sales promotion, sales force, advertising, price, quality, and service quality), they found that the higher the investment, the higher the ROI and the higher the market share. They, therefore, recommend an aggressive marketing investment by firms that have the resources to do so, if they want to achieve a high market share.

In the most recent and most integrative research to date on entry strategies, McDougall (1987) included magnitude of investment in her model. She concluded: "It appears from the research that an emerging taxonomy of new venture strategies that perhaps starts with a scale of

entry (large and aggressive versus small and limited growth) at one level and then proceeds to other key elements like vertical integration, channel usage, product characteristics, cost/price emphasis, innovation, service, and customer/market orientation would help map out alternative strategies. These, in turn, could be consistently examined and enriched by researchers, while also understood and used among practitioners" (McDougall 1987, p. 162).

Magnitude of investment needs to be included in any complete model of entry strategies (See Figure 2.2).

> **Proposition 2:** The larger the investment, the higher the performance. (Biggadike 1976, MacMillan and Day 1987, Urban, et al. 1986)

Entry Strategy: Competitive Advantage/Competitive Positioning

"Firms possess different competitive strengths that can negate the positions of others and enhance their own. These competitive strengths, in conjunction with vagaries of the marketplace, can dramatically alter the ultimate positions of firms that entered the markets at different times" (Schnaars 1986, p. 36).

This quote emphasizes the fact that not only can firms translate their competitive strengths into competitive advantage in a market, but that perhaps some firms are better suited to enter markets at different times. Both aspects need to be considered when evaluating possible entries.

Day and Wensley (1988) argue for a new conceptualization of competitive advantage and competitive positioning (Figure 2.3 from their article). Their model suggests that positional advantages arise from a firm's sources of advantage (or in Schnaars' terms competitive strengths) through strategic choices. A firm's sources of advantage include its skills or distinctive capabilities and its resources. A firm's positional advantage is its superior positioning in areas of value to the customer. This superior positioning, in turn, translates into better performance for the firm. Thus included in the entry strategy performance model (Figure

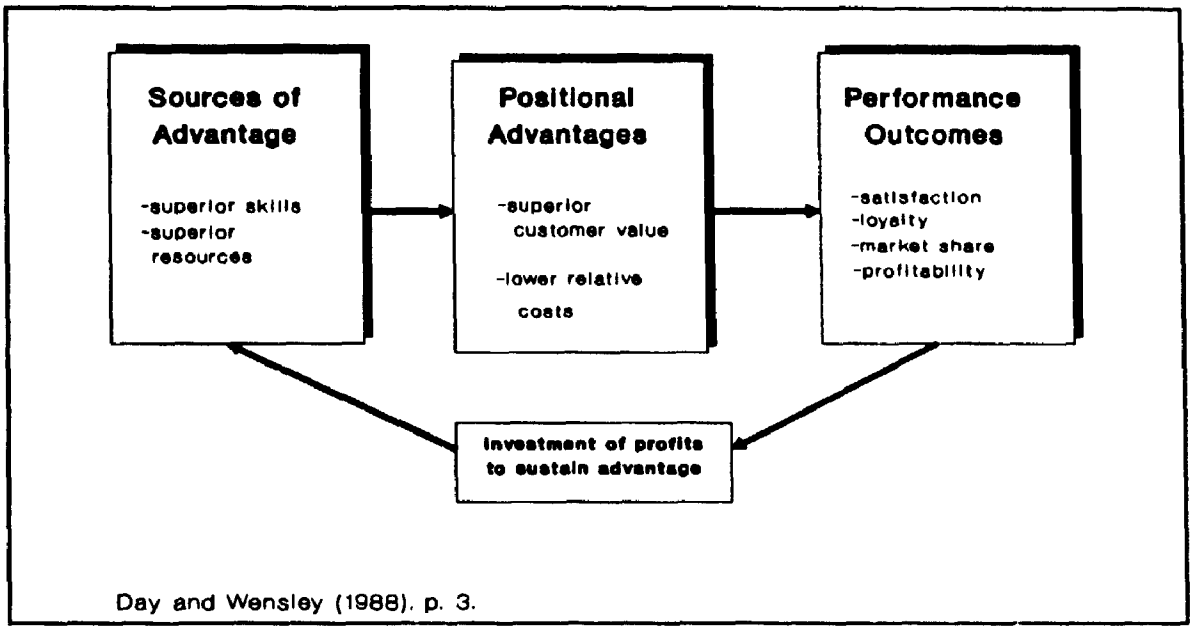

Figure 2.3 The Elements of Competitive Advantage

2.2) is the path linking Sources of Advantage to Competitive Positioning. (Also added to the model are two additional paths. These lead from Sources of Advantage to Timing of Entry and Magnitude of Investment. A firm's skills and resources may affect not only when a firm enters the market but in which areas the firm will invest.)

Day and Wensley's (1988) conceptualization of competitive advantage is the reason for the evolution of the 'competitive positioning' construct in the simple model of entry performance (Figure 1.3 - Entry Strategy to Competitive Advantage to Performance) into three components: 1) "area of competitive emphasis" --the managerial intent or decision on the competitive advantage to pursue; 2) "sources of advantage" --the superior skills and resources a firm has which it could, if it wanted, turn into a competitive advantage; and 3) "competitive positioning"--the image or positioning of the product relative to the competitors' offerings. (Note: Day and Wensley use the term "positional advantage.") Competitive

positioning or positional advantage[3], generally manifested as either superior customer value and/or as lower relative costs, results from the first two components.

Although Day and Wensley (1988) suggest a two-part conceptualization of competitive advantage (sources of advantage and positional advantage), the three-part conceptualization of competitive positioning in the entry strategy performance model is consistent with their conceptualization. In their discussion of drivers of competitive advantage, they discuss the third part of the conceptualization included in the entry strategy performance model: the managerial decision - basis for competitive emphasis.

> However, 'policy choices', the most prominent driver of differentiation, are discretionary decisions about activities to perform and how to perform them. Though such decisions are critical, they are not sources of advantage. Instead they are mediating events that determine the degree of leverage an instrument in a particular skill or resource has on differentiation (Day and Wensley 1988, p. 6).

What Day and Wensley refer to as 'policy choices' are included in the model as the 'magnitude of investment', because the policy determination of the area of competitive emphasis results in expenditures in the needed areas. Magnitude of Investment construct was discussed in the last section. It is through these policy or investment decisions that a company decides in what areas to invest and how much to invest for a product. These investment decisions, therefore, help determine the competitive positioning achieved for a product. This relationship is included in the model as the path between Magnitude of Investment and Competitive Positioning. Besides the three-part conceptualization of competitive positioning, the entry strategy performance model links the entire entry strategy to a firm's competitive positioning. This is an important and necessary addition as the entire entry strategy that a firm

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[3] Competitive positioning is preferred in the current model because, although a firm hopes to establish competitive or positioning advantages, this is not always possible. Yet, all products do establish an image or positioning relative to competitors.

adopts, as well as their sources of advantage, creates the competitive positioning a firm establishes. This, in turn, affects the performance of the firm (See Figure 2.1).

Much of the research in this area focuses on particular strategic dimensions or specific strategies rather than competitive advantage or competitive positioning per se. For many years the strategic management literature was simply a series of articles in which each author came up with his or her own descriptors of strategy classes. Recently, research has begun to change to empirically derived strategies. The problem with this research is replicability and comparison across studies. In the marketing literature, much of the research to date has focused on specific marketing mix variables and their impact on performance. Lately articles have begun focusing attention on competitive advantage and positioning issues. These articles have the most relevance to entry performance.

In his analysis, using a portion of the PIMS database, Biggadike (1976) factor analyzed the twelve marketing mix elements that were measured. These elements were: price, product quality, breadth of product line, breadth of customer types, breadth of customer numbers, breadth of customer size, distribution channels, distribution coverage, customer services, sales force expenditures, advertising expenditures, and promotion expenditures. These measures were taken 'relative' to the major competitors. The three resulting factors were labelled "aggressiveness"--low prices, high quality and greater marketing expenditures; "breadth"--concentration on the market segment served; and "luxuriousness"--higher prices, better quality, and improved customer service. These factors compare both to positioning and to magnitude of investment in the entry strategy performance model in this dissertation. Unfortunately, Biggadike did not associate a firm's position on these factors to its level of performance.

Urban, et al. (1986) developed a model of market share performance with the variables of positioning, timing and advertising. Positioning

was established with preference data. "The positioning variable is most significant followed by the advertising and order of entry parameters. A stepwise regression shows the relative explanatory power of the order of entry variable. If the order of entry variable is the first to be included, 32 percent of the variation is explained. Adding positioning increased the R^2 to 62 percent and including the advertising variable raised it to 76 percent. In each case the incremental variance explained was significant at the 10 percent level" (p. 652). This study shows the importance, in frequently purchased consumer goods, of positioning, magnitude of investment (advertising here) and timing in describing the entry strategy performance.

Other research in entry strategies has attempted to measure strategies, not positioning or competitive advantage. These studies are summarized in Table 2.2. One exception is the Green and Ryans (1990) study that measured competitive positioning by the Euclidian distance between the entry product and the customer's ideal product. This measure was available as this study used MARKSTRAT data. Unfortunately, in the 'real world' this type of measurement is difficult, if not impossible, to collect.

In summary, a sustainable competitive advantage, established at the time of entry, should lead to long-run success. Hence, the better a product's positional advantage, the better its performance (Carroll 1982, Day & Wensley 1988). The higher the customer's value, the better the performance of the product should be. A high quality product with a low price generally represents the best customer value. Low relative prices should also result in better performance (See Figure 2.3). Ceteris paribus, the general propositions that arise from the preceding discussion follow:

> **Proposition 3:** The higher the relative quality, the better the performance of a product.

Table 2.2 Studies Involving Strategy

Author	Strategy Studied	Strategy Determination	Strategy Classifications
Biggadike (1976)	Entry Strategies	Classification in literature review but dropped in analysis. The measures of strategic posture and marketing mix elements were discussed.	Posture: degree of integration and entry scale. Marketing Mix: relative price, product quality, breadth of product line, distribution, service, etc.
Sandberg (1984, 1986)	Venture Business Strategy	Assigned to Preestablished Categories by Expert and Author. The categories were developed from Abell, Vesper and Porter.	Business Definition Strategies: Undifferentiated, Differentiated, Focus; Political Substrategies: customer contract, favored purchasing, rule changes; Competitive Substrategies: Reduce Production Costs, Buy in with a Low Price, Offer Superior Product, Discover Segment or Niche, Marketing Innovation, Imitative Entry; Investment Strategies: High, Medium and Low Intensity
Smith (1985)	Marketing Strategy:	Empirically Derived Through a Two-Stage Clustering of the price, place, product and promotional variables in the database.	Three Marketing Programs: 1) Differentiated High Quality/Hign Cost 2) Show & Tell Strategy 3) Cost Leadership Strategy
McDougall (1987)	'Business Level Strategy'	Empirically Derived through a Two-Stage Process: The 24 strategy dimensions were reduced via Principal Components to nine components and through Cluster Analysis to eight strategy types	Large (three of the clusters) vs. Small Scale (two clusters)
Green & Ryans (1990)	Entry Strategies	Measures were taken for timing, magnitude of investment (in both R&D and marketing) and competitive advantage	Strategies were not classified into categories for analysis. Each firm was measured on each dimension of the components.

On the other hand, price is sometimes used as a surrogate for the real product attributes to judge product quality. "You pay for what you get". If this is the case, higher prices would communicate higher quality. This results in the following alternative proposition:

> **Proposition 4:** Higher relative prices result in better performance.

The path between Competitive Positioning and Performance in Figure 2.2 represents propositions three and four. A specific research project may examine more specific dimensions of competitive positioning, relevant to the product market(s) being studied.

Prior Entry Experience

Experience is developed from prior actions. What works and what does not are learned through experience. The more similar this experience is to a new endeavor, the greater the likelihood of success. The more experience a firm has with new product entries, the more likely are its future successes. Not only should greater experience improve market entry skills, it also may establish early credibility based on prior new product entry successes (Lawless & Fisher 1990). Pearce (1975) describes a similar concept - relatedness:

> Relatedness (or "propinquity") refers to the compatibility of the entrant's existing organization, resources, and activities with the requirements of the new business. Relatedness is an advantage to an established firm (as opposed to a newborn firm) when "2+2=3" in a cost sense and/or when 2+2=5" in a revenue sense. In other words, the "node communalities" in production, marketing, and/or management provide opportunities for greater efficiency and greater effectiveness. (p. 48)

Empirically, the importance of experience has been demonstrated in new entries by established firms (Rumelt 1982 and von Hippel 1977), new startups (Feeser and Willard 1990) and foreign entries (Gatignon and Anderson 1987). Rumelt (1982) found that firms with the highest levels of profitability had entered areas that drew on a common skill or resource. Firms diversifying into unrelated areas and into vertically integrated

businesses exhibited the lowest levels of profitability. Von Hippel (1977) summarizes his research results pertaining to a specific type of prior experience (experience with the same customers):

> ...over a wide range of product areas and scales of effort, we find a *strong* relationship between venture success and the prior experience of the parent corporation and/or the venture team with the customers addressed by a given venture. (p. 168)

The characteristics of founders in the computer industry (SIC 3573) were examined by Feeser and Willard (1990). Using cross tabulations, it was discovered that more high growth firms had founders with related experience than did low growth firms. This finding was reflected both in the type (related experience of primary founder) and the volume (size of the founding team) of experience. The more experience the founding team had and the more related the experience, the more likely the firm was experiencing high (not low) growth.

Logic and empirical evidence support the assertion that greater entry experience leads to greater entry success[4]. This construct, therefore, needs to be included in the entry strategy performance model.

> **Proposition 5:** The more similar a firm's prior product entry experience to the current product entry, the better the firm's performance.

> **Proposition 6:** The more entry experience a firm has had, the more success it will have with new entries.

These two propositions are included in the model (Figure 2.2) as the path between prior entry experience and performance.

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[4] One article, Smith and Cooper (1988), compared the relatedness between the parent and its offspring business in five industries. They found no relationship between the degree of relatedness between the parent and the child. This is not surprising given that their relationship measure was based on the SIC codes of the parent and new business. SIC codes only loosely reflect the interconnections between product markets. They more closely reflect similar input needs. Hence, if the important experience is with customers rather than suppliers, this would not be reflected in SIC relatedness. This weak test, therefore, does not either confirm or deny the importance of prior experience in new entries.

Industry Structure/Product Market Characteristics

> . . . there is a powerful case to be made for bringing the concepts and tools of industrial organization economics into new venture research. Prior research did not take advantage of them, but there now is evidence that this neglect has reduced the explanatory and predictive capabilities of new venture theory (Sandberg 1986, p. 129).

Sandberg drew this conclusion from the findings of his research into new entrants (new ventures in his study). He found that new ventures are more successful when 1) there are heterogeneous products, 2) industry evolution is in the growth or development stage, 3) there is disequilibrium in the industry, and 4) barriers arise after entry (support at significant levels).

Barriers of entry are cited frequently in the literature as deterrents to entry. They either need to be overcome to enter an industry or they need to be built to maintain an early position in an industry (Porter 1980). Karakaya and Stahl (1989) identified nineteen different market entry barriers that have been discussed in the literature[5]. There has been little empirical research to show whether these barriers do or do not affect entry.

Orr (1974) is an exception. He reviewed 71 Canadian industries in 1967. Entry was his dependent variable. Entry was measured as a net increase in the number of firms in an industry. "The analysis of the determinants of entry across the Canadian manufacturing industries permits several conclusions, most of which are consistent with a priori expectations. Capital requirements, advertising intensity, and high concentration are significant barriers to entry. Industry size

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[5] The nineteen market entry barriers are: 1) cost advantage of incumbent * 2) product differentiation of incumbents* 3) capital requirements* 4) customer switching costs* 5) access to distribution channels* 6) government policy* 7) advertising 8) number of competitors 9) research and development 10) price 11) technology and technological change 12) market concentration 13) seller concentration 14) divisionalization 15) brand name or trademark 16) sunk costs 17) selling expenses 18) incumbent's expected reaction to market entry 19) possession of strategic raw materials. The ones marked with an asterisk were identified as the most important entry barriers.

consistently had a positive impact on entry. Research and development intensity and risk are modest barriers to entry. Past profit rates and past industry growth rate had a positive but weak impact on entry. These conclusions remained in spite of alternative definitions of the variables and sample" (Orr 1974, p. 65).

In an attempt to understand the relative importance of different entry barriers in deterring entry, Karakaya and Stahl (1989) sent managers a decision-making survey to measure the importance of six market entry barriers: (1) cost advantage of incumbents, 2) product differentiation of incumbents, 3) capital requirements, 4) customer switching costs, 5) access to distribution channels, and 6) government policy). The managers were given market conditions (high or low) on the six barriers and asked to indicate the percentage of possibility that they would enter the market described (industrial or consumer; early or late market entry). Given the nature of the study it was not surprising that they found the six barriers to be important to entry decisions.

Yoon and Lilien (1985) examined the performance of 100 new industrial products one year after entry. They looked at original new products (ORNPs), which were new-to-the-world products based on a technological breakthrough, and reformulated new products (RFNPs) which were product-line extensions. For 'first year market share' for both ORNPs and RFNPs the following constructs were important: number of competitors in the market, marketing efficiency for the new product, and competitiveness of the market. Those particularly important for ORNPs are market growth rate and life cycle stage. Finally, the expanding product group and the buyers' satisfaction with existing services were particularly important for the RFNPs.

Simon (1986) surveyed Japanese managers, German expatriate managers in Japan, and German managers about their perceptions regarding entry barriers to the Japanese market, market characteristics and marketing instruments. He emphasized the importance of market characteristics on

the success of entries: "In order to develop and implement an adequate marketing strategy the specifics of a market must be profoundly studied and understood. The less similar a market is to the home or accustomed business environment the higher is the risk of applying an inadequate strategy" (p. 108). His research also emphasizes the importance of tailoring one's marketing strategy to the needs and characteristics of the market.

Ryans' (1988) research showed that when products were introduced into a high growth market, or a market with few direct competitors, firms achieved higher market share.

MacMillan and Day (1987) described a model leading from industry conditions to share objectives to investment decisions to performance. Yet they did not test the entire model. The only analysis done was bi-variate analysis from one construct to the next. Their examination of industry conditions: number of competitors, industry growth, dependence of largest competitor on target industry, number of immediate customers, and bureaucratic structure of major competitors was useful. They only tested the impact of the industry conditions on the share goals/expectations of management and, unfortunately, did not test their impact on performance. Their work, however, does indicate that managers do assess the industrial environment before setting share goals.

Investment decisions/strategy decisions, therefore, appear to be dependent on the manager's assessment of the environment and the corporate goals he/she hopes to achieve with a venture. Because industry conditions may affect strategy decisions, they should be considered in any model of entry strategies. The effectiveness of a particular strategy will also be dependent on industry conditions. This again argues for including industry characteristics in any model that will assess the performance results of an entry strategy. Figures 1.4 and 2.2 include a high level

construct called 'product-market characteristics'.[6] It represents whatever product market or industry structure characteristics that may be important in a particular product market. Table 2.3 summarizes the industry structure dimensions used in the integrative entry performance models. They generally have had a significant impact on performance.

In the next few paragraphs four of the major characteristics included in marketing, economics and integrative studies are discussed. A general proposition about how each may affect the performance of a product after entry follows each discussion.

Concentration. The concentration ratio at the time the product enters the market affects its performance. Evidence indicates that a U-shaped relationship exists between uncertainty and concentration (Pfeffer and Salancik 1978).

> When there are many firms in an industry and concentration is relatively low, the actions of any firm represents (sic) only a small proportion of the total industry; thus, any firm has few consequential effects on most of the other firms. As concentration increases, an oligopolistic market structure is reached, in which firms have increasing impact on each other. As concentration increases even more, uncertainty begins to decrease. With only a very few large firms operating, tacit coordination becomes possible, and each develops stable expectations concerning the others' behavior. (Pfeffer and Salancik 1978, p. 124)
>
> The greatest uncertainty arises when there are enough large firms to have major impact on each other but too many separate organizations to be tacitly coordinated. (Pfeffer and Salancik 1978, p. 125)

For a new entrant a higher degree of certainty about the incumbents' positioning and behavior allows it to establish a congruous entry strategy. If concentration is high, entrants know the positioning of the major incumbents. Rather than competing head to head they can target niche markets for more profitability. If concentration is very low

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[6] Product-market characteristics is a label, not for a single construct, but for a group of related variables or constructs. This 'cluster' of possible constructs is referred to in this dissertation as a 'high level' or 'general' construct. This is done to emphasize that this grouping needs to be operationalized into single constructs which may vary from one market to the next.

Table 2.3 Industry Structure

Author	Industry Structure Dimensions	Measures	Findings
Biggadike (1976)	Types: introductory monopoly, introductory oligopoly, growth oligopoly, growth monopolistic competitor, mature oligopoly and Growth Rates: Pre-entry growth rate (annual average) and Post-entry growth rate (annual average).	a) life cycle stage as assigned by manager and b) number of businesses in product market and share held by top four in year prior to entry.	Entrants in the moderate growth markets had the best financial and market performance but the lowest market shares. "...entry into introductory and mature stages and a tight oligopoly structure is associated with the highest operating and capital ratios and the most negative financial performance in the first two years"(p.127).
Sandberg (1984, 1986)	Differentiated Product (or not) by Number of Sellers: Pure Monopoly, Monopoly, Homogeneous Oligopoly, Differentiated Oligopoly; Stage of Evolution; Industry Disequilibrium; Sector of the Economy; and Barriers to Entry	See prior column.	New ventures were more successful in industries with heterogeneous products, in development or growth stages of evolution and where there is disequilibrium in the market.
Smith (1985)	Environmental Variables: Company Variables (conceive/design, manufacturing, nonmanufacturing), Competitive Variables (supplier power, customer power, threat of new/substitute products, inter-firm rivalry) and Customer Variables (type of user, purchase habits and characteristics)	Data were dichotomized, then clustered twice to arrive at three bundles of environmental variables: Type 1: Consumer Businesses; Type 2: Environment, Industrial Market Entrants Gearing Up for Market Entry; and Type 3: Environment, Experienced Industrial Market Entrants	Unclear. At one point in his dissertation he says patterns of the dependent measure (AVROI) did not vary before and after industry conditions were considered. In other places in the text he says industry structure and strategy are important in that when they are considered timing effects change.

Table 2.3 (continued) Industry Structure

Author	Industry Structure Dimensions	Measures	Findings
McDougall (1987)	Entry Barriers	1. Minimum Efficient Plant Size 2. Four-Firm Concentration Ratio 3. Advertising to Sales Ratio 4. Assets to Added Value Ratio 5. Rate of Growth of Demand	The composite measure significantly affected performance.
Green & Ryans (1988)	Industry Structure: market growth, concentration, market share volatility, strength of competitors and market size	See prior column.	The industry characteristics did not significantly affect behavior. This was likely because of the limited variability between the 'industries' in the simulation environment.

no firm's offering dominates the customer needs. The new entrant's success does not depend on the incumbents.

If uncertainty is high, whatever strategy the entrant chooses will carry with it greater risks. This happens when the incumbents are large enough to affect the market but are small enough to change rapidly to counter competitive threats. Whatever entry strategy is chosen is likely to have less success in an uncertain environment.

> **Proposition 7:** If the concentration is very high or very low, uncertainty is low and performance should be better. If the concentration is at an intermediate level, relative performance should be poorer.

Growth Rate. Both empirical (Ryans 1988 and Sandberg 1984) and conceptual (Day 1986) works have concluded that high growth at the time of entry affects subsequent performance.

Proposition 8: The higher the growth rate of the market at the time of entry, the better the relative performance of the firm. (Sandberg 1984, Day 1986, Ryans 1988)

Number of Competitors. Porter (1980) suggests that the more numerous the firms in an industry the higher the likelihood of mavericks that create instability and increased rivalry in the market. Similarly, Aaker and Day (1986) suggest that when the number and commitment of competitors are too great (often due to high growth and unrealistic market share expectations) there is competitive overcrowding. These statements by both Porter and Aaker and Day indicate that a greater number of competitors leads to poorer performance. MacMillan and Day (1987) in their study with PIMS data found a large negative correlation (-.61) between the number of competitors at entry and the firm's second-year share objective. Yoon and Lilien (1985) found an inverse relationship between the first-year market share of entrants in both new and reformulated product markets and the number of competitors in the market.

Proposition 9: The greater the number of competitors in the market at the time of entry, the lower the expected success of the new entrant. (Aaker and Day 1986, MacMillan and Day 1987, Porter 1980, Ryans 1988 and Yoon and Lilien 1985).

Potential Market Size. Although none of the studies listed below focused on market size, all support the following proposition.

Proposition 10: The larger the potential market size, the better the firm's overall relative performance is likely to be. (Anderson and Coughlan 1987, Glazer 1985, Green and Ryans 1990, and Lilien and Yoon 1990)

The general conceptual model of entry strategy performance includes a general construct called product-market characteristics. As the discussion above clearly shows some product-market characteristics at the time of entry may directly affect performance (Figure 2.2). Product-market characteristics could also affect the firm's decisions about when to enter a market and what types of investments to make in the entry. These paths have, therefore, also been included in the model (Figure 2.2). The important product-market characteristics, and their impact on these

decisions, may vary from industry to industry. When the model is used for research or decision making, the user must determine which characteristics are most important. Four of the most likely have been discussed in this section.

Integrative Studies

In the literature discussed to this point, most research has focused on one or only a few aspects related to entry strategy and performance. The discussion has served to suggest which constructs should be included in an general entry strategy performance model. The articles discussed in this section are prior attempts to interrelate many of the constructs affecting entry performance. The conceptualizations, findings, and shortcomings are discussed. The studies are summarized in Table 2.1.

The first study to try to relate entry success and industry structure was completed by Biggadike (1976). Table 2.1 describes the model he developed and the constructs he measured. "The framework developed for this study consists of four basic concepts: relatedness, market structure, entry strategy, and incumbent reaction" (Biggadike 1976, p. 9). Unfortunately, the complete model was never tested. Only portions of it were examined. "The most disappointing feature of the explanatory chapters was the need to analyze the impact of each variable individually. Obviously, explaining business performance is a multivariate problem, but I have not been able to formally do that" (Biggadike 1976, p. 193). Many of his results are inconclusive because a) the sample was a convenience sample from the PIMS database, and b) discussion of the analysis is inconsistent with the conceptualization of the problem (e.g., entry strategy results do not use the strategy categories derived earlier in the text).

Despite some problems with the execution and analysis of the study, Biggadike's work represents a significant contribution to the study of entry strategies. He was the first to discuss and begin empirical

examinations of the relationship between entry strategies, industry structure and performance. This highlighted these issues for the attention of other researchers. His study received a lot of attention in the literature. Most of it focused on his conclusion that it would take up to eight years for a parented (entrant from established firm, rather than a startup) entrant to achieve profitability (p. 55).

Following the statistical analysis, Biggadike used his qualitative knowledge of the forty entry case examples to hypothesize relationships between some of the constructs and performance. This provided both advice for practitioners and ideas for researchers. Although much of his advice to practitioners was probably premature, it did raise a number of issues that needed to be addressed by researchers. Relevant to the entry strategy performance model developed here, he made the following statements:

> "The major normative suggestion emerging from this study, in my opinion, is that entry on a large scale is necessary for eventual success in rapid growth markets. Entry scale here refers to both production and marketing scale" (Biggadike 1976, p. 200).
>
> In discussing the choice between an innovative new product and imitative strategies he says " . . . the choice would appear to depend on the parent company's skills and the timing of entry" (Biggadike 1976, p. 203).
>
> "Technical and marketing knowledge relevant to the entered market are very important" (Biggadike 1976, p. 202).
>
> [About industry structure he stated:] "The general impression from these two analyses is that entry into the introductory and mature stages and a tight oligopoly structure is associated with the highest operating and capital ratios and the most negative financial performance in the first two years. ... Unfortunately, these impressions cannot be tested in this sample because of the small subsample sizes" (Biggadike 1976, p. 127).

In 1982, King and Thompson published a study of long-term market success and concentration levels at entry. Although it is not an integrated study of entry strategies per se, the findings support the establishment of an integrated model to explain entry performance. They examined the entries of 209 new brands in nineteen grocery item product

markets. The year or timing of entry did not have a statistical impact on subsequent performance[7]. Yet, grocery product entries who did not achieve an early market share failed also to achieve long-run market share success. The implication is that the entry strategy is important for long-run success. An entry strategy that establishes good competitive positioning, via the product and its visibility in the market, and product availability, can lead to long-term success. This will only happen if the entry strategy chosen is appropriate for the time chosen to enter the market. Consideration of timing could, therefore, facilitate success.

Sandberg (1984, 1986) described and developed a multivariate model of new venture performance (New Venture Performance = f(Entrepreneur Characteristics, Industry Structure and Venture Business Strategy). Unfortunately, due to the limited size (17) of his non-random sample, and the ordinal and categorical measures that he collected, he was only able to test a few bi-variate hypotheses using non-parametric statistics. Still he found that some aspects of business strategy and industry structure were related to success. These results indicate that the pursuit of the study of these constructs and their relationships is worthwhile.

The next study to use a framework for examination of entry strategies was Smith's 1985 dissertation. He examined the 97 startup businesses in the PIMS SPIYR database. He hypothesized that timing of entry, marketing strategy, and environmental variables would affect the new entrant's performance. He empirically derived three marketing programs (Table 2.2) and three classifications of environmental variables (Table 2.3) through a series of cluster analyses. Using three-way and two-way ANOVA he analyzed the data. His "analyses indicated that

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[7] It is likely that King and Thompson failed to find timing to be important to success because 1) timing was measured in years since the surveys began, not in relation to the beginning of each of the product markets as would be more appropriate and 2) the conditions for entry and appropriate timing may be different for the nineteen different product markets.

environment and/or marketing strategy do affect timing of entry/performance relationships" (Smith 1985, p. 153). Specifically, he stated:

> Timing of entry/performance main effects across all environments and marketing programs do exist, but they are misleading in that they disappear when environment and marketing strategy are considered. This fact casts doubt on a substantial body of research in which the effects of environmental and/or strategy variables on performance relationships have been ignored (Smith 1985, p. 134).

His research provides strong support for the need to examine the interrelationships between these constructs and not to study them in isolation.

McDougall (1987) hypothesized that new venture performance could likely be explained by using three basic concepts: strategy, entry barriers, and venture origins. (Venture origins refers to whether the firm was parented, such as the firms in Biggadike's (1976) study, or whether they were individually founded firms such as those in Weiss' (1981) study.) Using the general linear model she hierarchically tested seven models for the best performance predictor. She found that the model of strategy plus entry barriers plus their interaction is the best model to predict new venture performance. The new venture origins did not have a significant impact on performance.

Table 2.2 summarizes the strategy dimensions that McDougall used and how she developed her strategy categorizations. It should be noted that she did not include in her study the timing of entry construct. The other basic elements of an entry strategy, magnitude of entry and competitive advantage, may have been indirectly or at least partially covered in her strategy dimensions and categorizations. Industry structure was also included in McDougall's study. She operationalized industry structure by utilization of the measures of entry barriers. Details of what she included are summarized in Table 2.3.

McDougall's research is a major step forward in the integrative studies of entry strategies. She has included some aspects of both entry strategy and industry structure and was the first to do any multivariate

analysis of the data. Given the nature of the data she used and her hypotheses, structural equation modeling may be one approach that would have enabled her to extract more information from the data. Several researchers in this section had multiple measures of several variables (e.g., performance) so that they repeated their statistical tests with each measure. With causal modeling the researcher could use these multiple measures in one model. Inferences about causal relationships between the constructs of interest also could be developed.

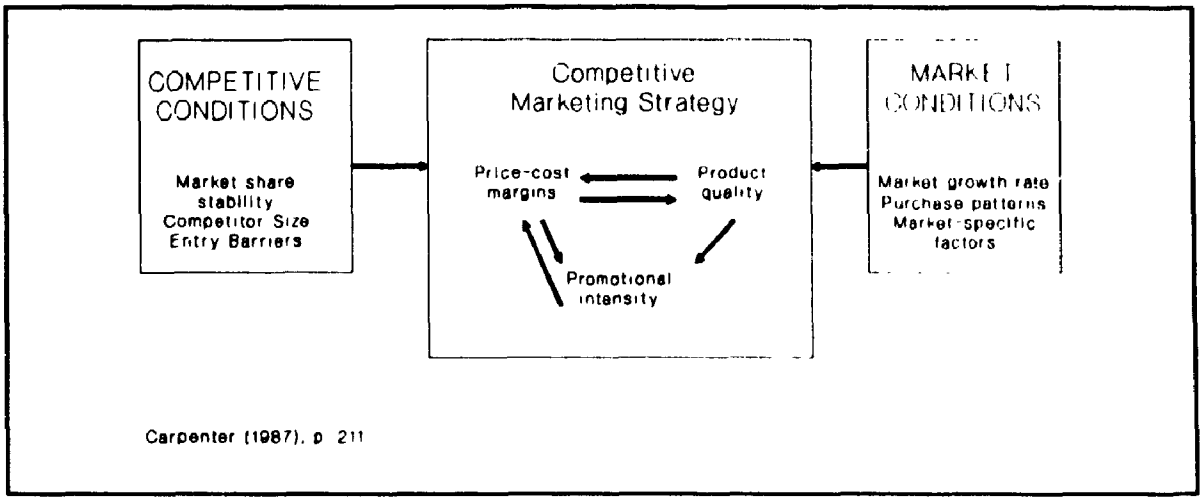

Figure 2.4 Schematic of Carpenter's Structural-Equation Model

Carpenter (1987) is the first to examine systematically multiple influences on performance. His study focuses on the relationship between market or industry conditions and various elements of the marketing mix. He does not study entry strategy, as defined in this paper, but his research approach and findings are about entry strategy. In his model he examines the relationship between industry structure (competitive conditions and market conditions in his terminology) and a firm's marketing strategy, which, as defined in this paper is a major component of an entry strategy (See Figure 2.4).

To test his model Carpenter uses a split sample (550, 550) of randomly selected PIMS businesses from 1974 to 1984. He uses structural equation modeling to test the entire model. He finds "competitive and

market conditions have a significant but small effect on the marketing mix formulation compared to relationships between marketing mix elements" (Carpenter 1987, p. 218). As he did find a 'significant but small effect' on the marketing mix elements it may be important to consider a 'causal link' between industry structure and entry strategy in the model being developed in this dissertation (See Figure 1.4).

Carpenter's (1987) research is an important step forward in the research on marketing strategy because of the use of structural equation modeling to try to relate these important constructs. The next step is to examine the relationship between these two dimensions and firm performance.

The population ecology model was used by Lambkin (1988) as a framework to understand firm entry performance. Equating the three ecological niche strategies with the first three stages in the product life cycle she hypothesized the predominant strategy that a firm would adopt when entering the market during each product life cycle stage. It was hypothesized that pioneers would enter either as generalists on a large scale or specialists on a small scale. The ecological model suggests that the large scale generalists should enjoy greater success and adapt better to their changing environment. The ecological model suggests that the next group of firms to enter, in the growth stage, would be organizations that have extensive resources but few skills in related areas. They would likely have the lowest level of performance of the three entrant groups. Finally, as the market matures, the premium placed on competitive efficiency would cause any new entrants to enter on a small scale in order to exploit marginal area niches. Their success should be intermediate--between the pioneers and early followers.

In general, she found that strategies do differ depending upon the timing of the firm's entry. For the most part the strategies are in the direction predicted by the ecological model.

Lambkin (1988) used the PIMS start-up database (STR4) of 129 businesses to test the hypotheses. The hypotheses were also examined with a sample of adolescent businesses from the PIMS database (SPI4). Using sixteen variables, three categories of entry characteristics were measured: relationship to parent (level and types of resources available to it by virtue of ownership), entry strategy (scale of business established at the point of entry), and competitive strategy (competitive position on several dimensions). She found that when timing alone was considered (dummy variables for pioneer and early follower), there was a strong effect on market share (R^2 = 0.13 in the startup sample and R^2 = 0.21 in the adolescent sample). The equation was interpreted to mean that the strongest positive impact of timing on market share was felt by the pioneers (highest beta), followed by the late entrants (constant term) with an insignificant coefficient for the early followers. This implies a curvilinear relationship between timing, as measured, and performance although the use of simple linear regression suggests a positive impact of timing on market share.

The ANOVA results ($p < .01$) do seem to suggest a much higher relative market share for pioneers than for the early followers and late entrants. No statistical test was provided to show whether a significant difference existed between the early followers and late entrants. Visually, they do not appear to be different for the start-up sample. The results are reversed (with a larger magnitude) for the adolescent sample. It, therefore, does not appear that the data support the hypothesized curvilinear performance result. The other measures of performance show even weaker results. Still, the strong correlation suggests that timing, even when grossly measured as in the PIMS database, does have an impact on performance and should be included in any model attempting to measure entry performance.

Lambkin's study also provides support for the inclusion of both the magnitude of investment construct and the positioning concept in a model

of entry performance. She found that the order of entry effect is significantly weakened when the effect of other dimensions of structure and strategy are included. She suggests that two categories of variables may equal or surpass order of entry in terms of their influence on market share: the scale at which a business commences operations, and the competitive strategy that it uses to develop its business. She goes on to say "the nature of the interactions between order of entry and these other variables is not apparent from the results of the equations shown here, but clearly this is a topic worthy of further analysis" (p. 137). The three categories of variables that Lambkin refers to in this paragraph are the three dimensions of entry strategy included in the conceptual model of entry strategy performance presented in this dissertation (Figure 2.1).

Green and Pyans (1990) developed a model of entry performance and tested it in the simulated MARKSTRAT environment. The model includes both entry strategy (timing, competitive advantage, magnitude of R&D investment, and magnitude of marketing investment) and industrial structure variables. Causal modeling was used to test the model. The results provided strong support for the importance of entry strategy on performance. The relationships between the industry structure variables and performance were not significant. This is because of the similar environments that each entrant faced in the simulation environment. This study is an important step forward in the research on entry strategies as it a) shows the viability of using causal modeling to test models of firm performance, and b) gives support for the inclusion of entry strategy in the explanation of performance.

The latest attempt to integrate a number of entry constructs to explain later performance behavior was reported by Gatignon, Weitz and Bansal (1990). They used econometric modeling. Many of the constructs they examined have been identified as important to entry strategy performance in this literature review. The model they tested to estimate performance is listed below. The coefficients found to be significant are

bolded. They had a good explanation with the model of 78% of the variance explained.

Market Share = **Relative Product Quality** + **Detailing Minutes Share** + **Concentration Ratio** + Experience (number of brands in same product class) + Firm Size (Sales in Dollars of Firm with intro) + Product Quality & Detailing Interaction + **Growth & Detailing Interaction** + Market Familiarity & Detailing Interaction + Firm Size and Detailing Interaction

This model indicates that two entry strategy components, competitive positioning (represented by product quality) and magnitude of investment in marketing (time spent detailing the product) were important in explaining entry performance. Gatignon, et al. also found support for the effects of one of the product-market characteristics, concentration, on performance. The market growth at the time of entry also seems to have an indirect effect as an interaction with the magnitude of investment undertaken at entry.

This research is an important contribution to the study of entry strategies. The generalizability of their results is limited by the idiosyncracies of the industry studied. In spite of this, the results support other studies on entry strategy and the entry strategy performance model developed in this dissertation.

Conclusion: Review of Gaps in Literature/Research Needs

This review of the literature shows support for the entry strategy performance model in Figure 2.2. The key concepts of interest in this model are entry strategy, competitive positioning and performance. These are the concepts which should be emphasized in any research including this model. Company characteristics/sources of advantage, prior entry experience and industry/competitive conditions are additional constructs relevant to entry performance. They are included in the overall model because 1) they also may affect performance, or 2) they may affect the entry strategy chosen.

Lack of Integration of Concepts/Research Methodology

The need for integrative entry strategy research has been recognized by several authors (Biggadike 1976, Sandberg 1984, Smith 1985, McDougall 1987). Unfortunately, the methodology used has been unable to analyze many of the variables and relationships which affect entry. The use of a causal modeling technique such as LISREL or PLS would enable the researcher to examine the relationships among the constructs and between each of the constructs and performance. One study utilized causal modeling to test entry into the Vodite market of the MARKSTRAT simulation (Green and Ryans 1990). This work represents the first test of a multi-faceted model of entry strategies. This type of research n s extension to the real world.

Type of Data Set

A problem inherent in much of the current literature is that most of the research studies are based on data sets that do not allow the researcher to explore entry strategy performance fully. The most common data sets used are either a limited number of case studies (Bevan 1974, Sandberg 1986) or the PIMS database (Biggadike 1976, Yip 1982, Smith 1985, Robinson & Fornell 1985, Carpenter 1987, MacMillan & Day 1987, and Robinson 1988). Both limit the researcher in the study of entry performance. The use of case studies, although it generally produces very rich data, limits the statistical analysis and generalizations which can be gleaned from the data.

Use of the PIMS research base gives the researcher an adequate sample size and some longitudinal data. There are, however, many limitations which the PIMS database imposes on entry research:

1) construct measurement is limited to those variables within the database (e.g., timing is a gross measure, a self-designated PLC stage);

2) the entries included in the database have all been started by large corporations willing to invest both a lot of time and money into developing a new entry; hence they do not represent the entire population of new entries;

3) analysis is limited to that which can be done with the data analysis programs available with the PIMS database system; and

4) validity of the measures of some of the important constructs is suspect (e.g., market share--definition of market may change over the years as managers are pressured to improve their product's performance and the firm begins to segment the market or expand its offering to a wider market).

A longitudinal study is expensive in terms of time and money. Hence it has not been used in the study of entry strategies, with the exception of data sets such as PIMS. Most entry strategy research to date, therefore, has been retrospective studies where performance is measured today and managers provide information about the past. As with all retrospective research the data are subject to distortions caused by memory lapses, changed perceptions, and interviews with personnel who had little to do with the decisions or their results.

The model of entry strategy performance (Figure 2.2) indicates that the entry strategy at one particular time affects the later performance of the product. The impact of entry strategies on future performance, therefore, makes a longitudinal study the 'ideal' study. A longitudinal study has many drawbacks (other than sizable time and money demands) and has not been used in the study of entry strategies (except for data sets such as PIMS). Three of the disadvantages are: 1) firms may discontinue their participation in the project over time; 2) accounting/reporting methods may change over time making comparisons difficult; 3) also market definitions may change over time making comparisons of the interim measures impossible.

In summary, although the literature and research have indicated the need for a more integrative model, the research does not address this need because of either inadequate data sets or other limitations. Both deficiencies have limited the amount of progress in this area. The research in this dissertation will help bridge these gaps in the literature and extend our knowledge of entry strategies and their impact on performance. In the next chapter the basic research design for an empirical test of the

entry strategy performance model is described. This research design overcomes many of the problems with past research in this area.

CHAPTER THREE
RESEARCH DESIGN

Overview

The entry strategy performance model developed in this dissertation addresses the need for a more integrative model relating the entry constructs and performance. The need for empirical research of this type of integrative model will be addressed in the remainder of this dissertation. The choice of appropriate data sets and statistical analysis tools are critical for a test of this model. These are described in this chapter.

An archival examination of the U.S. microcomputer software industry was undertaken to test the model (Figure 2.2) developed in the last chapter. The primary means of analysis is causal modeling, specifically PLS. The model and specific construct operationalization are discussed in the next chapter. This research design fills the gaps in the literature and contributes to both the managerial and theoretical literature on entry strategies.

This chapter is organized around key issues associated with the chosen research design. The chapter begins with a description of guidelines used to develop measures for the constructs included in the general conceptual model (Figure 2.2). The appropriateness of the chosen research setting is next discussed in detail. Critical measurement issues are raised, discussed and resolved in this chapter. The next chapter provides the details of the specific operationalization of the constructs in this dissertation.

Construct Measurement in the Entry Strategy Performance Model

Possible operationalizations of the constructs in the model are discussed in the next few sections. A summary of these measures is in Table 3.1. A general description of the constructs and the general guidelines for measurement follows.

Table 3.1 Entry Performance Model Generic Construct Measures 58

Timing: When the entry occurred, relative to competitors
-time period since first market entrant
-product life cycle stages

Magnitude of Investment: 'Expenditures' relative to competitors
-r&d, advertising, promotional expenses, sales force & distribution expenses
-if foreign entry--mode of entry, i.e., relative investment levels

Competitive Positioning: relative customer value or relative costs
-relative positioning on a number of dimensions:
general (applicable in all markets): e.g., quality, price
specific (applicable for specific markets studied): e.g., magazine coverage in microcomputer software industry

Prior Entry Experience
-experience with other similar product-market entries

Company Characteristics/Sources of Advantage: relative skills and resources
-resource base: e.g., capital, production facilities, brand name, and distribution access
-skills: e.g., r&d, marketing, and production
-company strengths

Product Market Characteristics: general measures for all industries, more precise measures if similar industries studied
-growth rate
-concentration: amount of market share held by top four competitors
-industrial/consumer market (e.g., percent of output purchased by households, by businesses)
-entry barriers e.g., McDougall (1987) used: minimum efficient plant size, four-firm concentration ratio, advertising to sales ratio, assets to value-added ratio, rate of growth of demand
-product-market characteristics e.g., Smith (1985) used number of end users & number of customers from the PIMS database
-market segmentation
-size of self/size of competitors e.g., Carpenter (1987) with PIMS
-number of competitors e.g., Yoon and Lilien (1985), Simon (1986)

Performance Measures: Relative to Competitors in Same Industry
-market share
-profitability: absolute, comparison to major competitors in the industry
-return on investment, return on sales, market share growth-(McDougall's mail questionnaire, 1986)

Entry Strategy

Timing should be measured by the actual date of entry, not the date that the managers planned to enter the market. The timing measure is the entry timing compared with competitors' date of entry. This measure could either be in terms of positioning in the product life cycle or number of time units since the first firm entered the market.

The magnitude of investment is not what management planned to spend, but what management did invest, compared with its competitors' expenditures. This measure could include expenditures on: research and development, 'marketing', advertising, and distribution. The importance of each of these measures varies depending upon the product market entered. Measures of magnitude of investment are often proprietary. This may require the researcher to measure only one or two magnitude of investment dimensions or to use surrogate measures.

Management decide implicitly or explicitly how they want to compete in the market, that is, what they want as their area of competitive emphasis. This decision is based on 1) their understanding of the product market, 2) the firm's sources of advantage, and 3) their prior entry experience. The actual competitive advantage or positional advantage achieved may (or may not) be what the managers hoped to achieve. The positioning created is not necessarily perceived as an 'advantage' by the consumers. For this reason, in this dissertation the positioning construct is called competitive positioning. This allows not just positive positioning, commonly referred to as competitive advantages, but also negative, and neutral positioning. Once again, it will be the achieved competitive positioning, not the planned positional or competitive advantage that will be measured. Competitive positioning is the value the product represents to the customer. This could be in terms of quality, price or, a more encompassing term, value. As Figure 2.1 shows, the competitive positioning arises as a result of all three entry strategy decisions.

In the marketplace these broad positional generalizations translate into specific features that consumers value in relation to a particular product. They are then willing to make tradeoffs among the attributes of the various product offerings and pricing. The importance of these different 'advantages' is likely to be quite different across product markets and even across various segments within a single product market.

Specific operationalization of competitive positioning must consider the specific product markets and be tailored to reflect the important positioning dimensions in them. A cross-sectional study across many varied product markets requires measures in broad general terms such as an overall quality rating. If, however, one or a number of similar product markets are studied, specific dimensions on which consumers value quality could be measured. In automotive-related product markets quality could be measured on dimensions such as gasoline mileage, appearance, performance, or luxury. Use of specific measures rather than general measures should provide a better, more thorough understanding of the positional advantages each product has achieved in its markets.

The reason that the achieved, not the proposed strategy, is the proper measure is that the performance predicted from the entry strategy model arises from the achieved entry strategy and how effectively the strategy was implemented. The implementation aspects of a strategy are beyond the scope of this model.

Prior Entry Experience/Sources of Advantage/Company Characteristics

A large number of company characteristics may be associated with the success of an entry strategy. Prior entry experience and a firm's skills and resources are the ones included in this model. A firm with prior entry experience not only may be able to identify a better entry strategy, but also may have developed better implementation skills. Generally, previous studies have only crudely measured prior experience by noting whether a new venture was 'parented' or not (Biggadike 1976, Rumelt 1982), that is, if there was ownership by an established firm. A parented venture, presumably, would have more past experience with entry than a new venture. It would also have different capital and resource access than a non-parented venture. To understand the importance of prior entry experience, this construct needs more precise measurement than it has had in research in the past. Prior entry experience should include more

specific measures of a firm's prior experience with the products or markets relevant to the entry under consideration. The more similar the products and markets to the new entry, the more useful the experience.

Discussion of the importance of recognizing the peculiar nature of different competitive markets and, therefore, the importance of different positional advantages in different markets appeared in the last section. This logic also applies to the different sources of these advantages or firm characteristics, which lead to those positional advantages. Once again, it is important to measure not just generic sources of advantage (e.g., superior skills and superior resources) but also the specifics for particular product markets, depending on the type of study (cross-sectional or selected product markets). That is, what constitutes superior skills and superior resources in a particular product market? Superior access to capital alone does not guarantee a successful entry and may not even be that important in particular markets. Other possible sources of advantage are in Table 3.1.

Product-market Characteristics

As the industrial organization literature points out (Porter 1980), industry structure may have an impact on behavior and performance. The marketing literature also highlights the importance of providing customer value and having a competitive advantage in the targeted segment. Industry and competitive conditions, which may affect product performance, need to be included in a study of this type. Examples are: growth rate, concentration of competitors, potential market size, number of competitors and type of product market (consumer/industrial). All have been associated with the anticipated success of a firm. Other possible measures are in Table 3.1. Once again, study of selected product markets requires the selection of specific measures for those markets.

Performance

The resulting performance is the dependent construct in this model. It is what results from the entry strategy, competitive positioning, prior entry experience and industry characteristics. Two measures of success are employed here: market share and profitability. These two are chosen because one or both are included in most discussions of business success. Both should be gathered, if possible, because they measure different aspects of success.

There is some controversy in the literature about whether or not profits and market share are always positively correlated. This probably arises from measures being taken at different stages in the product life cycle. While the market is still growing an aggressive pursuit for market share, sacrificing short term profits, may be an investment in long-run profits. Measurement for an aggressive firm in a growth market would show poor profits, but good market share. A firm pursuing a skimming strategy, on the other hand, may have high profits but low market share. It is likely that both measures are correlated as the products move toward maturity. The inclusion of both measures captures both types of success (unit sales and profits) for a firm at whatever stage the market has developed.

Research Design

The entry strategy performance model (Figure 2.2) is examined empirically through an archival study of the U.S. microcomputer software industry. The rest of this chapter details the issues and decisions associated with this research design.

Data Set and Methodology: Archival Study of the Microcomputer Software Industry

Suitability of Chosen Product Market. Because of 1) the short product life cycles, 2) the voluminous amount of information available on

the microcomputer software industry, and 3) the large number of entrants in such a short period of time, it is possible to conduct a longitudinal study of entry strategies and their performance over a short period of time, an exercise not possible in most other industries.

Since the introduction of microcomputer kits and the first commercial software for microcomputers in 1975, literally thousands of microcomputer software programs have been commercially produced. (The first compiler, *BASIC*, was released in 1975, the first game, *Micro Chess*, in 1976, and the first word processor, *Electric Pencil*, and the first spreadsheet, *VisiCalc*, in 1979.) It is, therefore, possible to trace the entire microcomputer software industry and its development to date in only 15 years. Many different software product markets have evolved. Many software firms have come into and gone out of existence. Many more products have been introduced to the market. Some have been successful; most have failed.

The microcomputer software industry is an important industry both in terms of its size within the economy and its influence on people's lives. It is a growth industry that is heavily dominated by North American firms. Continued success in this industry will be very important to North American firms. The size of the 1985 software market was estimated at 5.2 billion dollars (Bertrand 1986, p. 94). Estimated world wide sales for the entire software and related services industry were $110 billion dollars in 1990 (Brandt 1991). Sixty percent of this market is serviced by U.S. companies.

This industry is important, not just because of its own nature, but also because it is similar in structure to some other industries. It is characterized by high technology, high growth, and short product life cycles. Some of the characteristics that set the microcomputer software industry apart from other industries are: 1) the short period of time since the industry has begun and 2) the speed at which conditions and products are changing in the industry.

The topic of entry and the timing of entry are concerns in the microcomputer software industry. Two quotes illustrate the general interest and 'novice' beliefs as to what makes a successful firm in the microcomputer industry. The first quote highlights common thinking on this topic and on pioneer advantages. The alternative is discussed in the second quote. That is, followers can do very well, if pioneers lose sight of the market. Both authors believe their perspective is absolutely correct. The research proposed in this paper should help answer these questions and test the entry strategy performance model.

> The guys that really clean up in this industry are not the ones that build the better mousetraps. They are the ones who come up with a totally new application for the computer, define a new industry, and let everyone else play catch-up.
> From that point on, there is still a lot of research and development and marketing to do. But it's easier to maintain your position as the standard setter for a particular application than to try to come from behind.
> . . . they can make a bundle for the guy that made the idea work in the first place." (Sloan 1988, p. 16)

> Market leadership changes when the top sellers fail to match the progress of aggressive newcomers. Among word processing programs, witness the decline of WordStar and Multimate and the rise of WordPerfect and Microsoft Word. Chart-Master and Microsoft Chart, which were the graphics leaders in the era when the PC-XT and 6-MHz AT were king, have fallen out of the top spots, too. They're still better performers and sellers than many graphics programs, but 5 percent of the market share and third or fifth place don't seem like much when you once had 15 to 25 percent. (Howard & Kunkel 1988, 94-95)

Data collection for this project could have varied anywhere along the continuum from personal interviews to archival data. The usual pros and cons involving money, time and coverage apply. Some characteristics specific to the software industry affect the choice of appropriate data collection techniques.

Market shares are highly concentrated in several categories of the software market: graphics, word processing, databases, and spreadsheets (Howard & Kunkel 1988). Therefore, mail questionnaire results would be difficult to interpret unless all the key players responded. On the other hand, this concentration argues for either archival research or direct personal data collection. With only a few main players there is much

information published about these products. On the other hand, a limited number of players also means that it would be practical to contact all the main players in the industry. However, achieving their cooperation is another matter. Either of these methods would result in a small sample size.

For most second generation data analysis methodologies, such as causal modeling, a large sample is necessary to test a complete model. Therefore, a mail questionnaire to all players in a product-market category could be conducted. A healthy response rate would allow use of second generation data analysis techniques. The difficulty with this method is that many of the respondents would represent trivial market shares, and therefore, would not represent the total market. Also, if the missing cases were the major players, little confidence could be placed in the results.

As will be discussed in the next section, one type of causal modeling, partial least squares (PLS), allows for model testing with a small sample size. Use of this technique would allow data collection by means other than a mail questionnaire for this industry.

Data Collection: Measures and Methodology. Although the topic will be discussed in detail in the next chapter, it is important to discuss the ease of operationalizing the variables in the general research model of entry performance (Figure 2.2). The methodology chosen for data collection depends on its ability to measure the necessary constructs. Some methods of data collection are better than others for measurement of particular constructs.

Table 3.1 lists some possible measures for each of the constructs in the model. All the constructs, and most of the measures, listed in the table have been used in studies. Conventional measures have, therefore, been developed for most of them. There are two general exceptions: prior entry experience and competitive positioning. Prior entry experience is

a straightforward concept that can be operationalized with ease. This is not the case for competitive positioning.

As the literature review points out, a consensus is only now forming on how competitive advantage should be defined and measured. Sources of advantage can be measured 'relatively' easily (see Table 3.1). Competitive positioning is somewhat more difficult to capture.

Day and Wensley suggest both customer-based and competitor-based measurements. Traditionally, studies utilizing competitive advantage or competitive positioning as a construct use a competitive measure which rates how well a product performs on certain dimensions relative to its competitors. Day and Wensley point out that this is also the method firms use internally. Rarely do firms get measures from their customers regarding their positional advantages. Day and Wensley (1988) argue that firms and researchers should utilize customer measures more widely. It is the customer's perception of the product's positioning that determines how successful a product will be.

The microcomputer software industry is one of the few industries where extensive impartial product reviews are conducted and reported. These product reviews are written by experts in the field for microcomputer magazines. These magazines are in turn used by 'experts' in businesses who recommend the purchase of microcomputer software products. The products are compared on important features for that class of products. This impartial, customer-based information on positional advantage in the microcomputer software industry is exactly the type of data that is needed to measure competitive positioning. Since this information is available for so few industries it makes a strong argument for studying the microcomputer software industry. This data availability argues for using archival data collection at least for competitive positioning.

Questionnaires, whether via personal interview or mail, are the usual methods utilized for researching strategy and performance. The biggest problem with this type of data collection is the distortion in

perceptions that can occur over time. For example, the perception of the comparability of a product with the competitor's products will be 'colored' based on the eventual success or failure of the product. Successful products (and their entry strategies) would be seen in hindsight as much better than they were, whereas the reverse is true for failures. In the study of entry strategies it is important to know exactly what the entry strategy was. Getting any information, even biased information, is often quite difficult due to changes in personnel and incomplete records of the entry.

On the other hand, there are some powerful arguments for collecting data after entry occurs. For some constructs this leads to better measures. For example, at the time of entry a firm is unlikely to know its competitors' expenditures. Estimation of their relative magnitude of investment is, therefore, impossible. At a later date this information would be more widely available. Similar advantages to the retrospective analysis would exist in the measurement of variables such as the growth rate, concentration of competitors, and competitive positioning. The goal of the entry strategy performance model developed in this dissertation is to explain entry performance. A more accurate measure of many of these variables exists at some time **after** the entry. With this more accurate measure of what happened the model can be appropriately tested.

Given the above arguments, a longitudinal study would be the ideal methodology to use to study entry strategies. This would involve contact with the firm and data collection on the entry strategy at the time of entry. Later performance measurements could be gathered from the firm and its customers. Some time between entry and performance data, competitive positioning measures need to be established. This methodology is expensive in terms of both time and money It is well beyond what could feasibly be done in a doctoral dissertation.

Archival data collection is a methodology which captures the advantages of the longitudinal methodology, but at much lower cost. This is

another reason the microcomputer software industry is an ideal database for the study of entry performance. In this industry, measures for most of the constructs in the model (Figure 2.2) have been published and published recently. It is a new industry which has spawned much interest and a large number of publications. Rumours, product announcements, sales figures, and product reviews are published. There is a lot of archival information available on the industry.

Archival data collection allows the researcher to collect data which were recorded at the time the event occurred or shortly thereafter. As memory distortions often occur when the outcomes of an event are known, this method overcomes the problem of the questionable reliability and validity of retrospective data. Data for all the constructs in the model can be collected from archival records. For example, the entry strategy, as it was implemented, can be ascertained at the time of entry. The competitive positioning at the time of entry can be captured by examining the first product review after entry. Relative (e.g., pricing and investment expenditures) and product-market conditions also can be collected from the time of entry. Finally, performance can be measured by collecting data at an appropriate later date.

Product market Definition/Product market(s) to Study

Thousands of products have been introduced in the microcomputer software industry. Study of all would be neither possible or necessary. A strong test of the entry strategy performance model requires careful selection of specific products and product markets within the microcomputer industry. Two criteria were used. First, enough information must be available to provide a viable test of the model. Second, the market(s) should not be niche markets but should be markets where the results would be generalizable to other product markets.

Three major decisions must be made in this regard: 1) the 'type' of software to be studied, 2) the operating system(s) for the software and 3) the specific product market(s) for study.

Choice of Operating System

Growth in the microcomputer industry is intertwined with growth in microcomputer software. Once the initial hardware had been developed it took software to make the machines useful and saleable to the non-hobbyists.

The microcomputer revolution began in 1975. In the late 1970s microcomputers were purchased and used by hobbyists. Microcomputers were adopted only by hobbyists until commercial software became available. The first significant step in the diffusion of microcomputers and microcomputer software came when Gary Kiddal developed the CP/M operating system. Finally, users did not have to start from scratch with each type of computer. Software developers did not have to write different versions of programs for each type of computer. This advance, therefore, allowed the beginning of commercial microcomputer software production.

The first successful microcomputer application program was *Visicalc*, introduced in 1979. It was the first spreadsheet. It was written on the Apple II machine because it happened to be the only microcomputer machine available to the authors of the program. *Visicalc* changed forever the microcomputer industry. Prior to its introduction microcomputers had been targeted at hobbyists and the entertainment or games market. However, with the introduction of *Visicalc*, businesses began buying Apples to use the spreadsheet program. The success of Apple computers did not go unnoticed.

In August 1981, IBM announced its intentions to enter the microcomputer marketplace with a 'personal computer'. The most shocking aspect of IBM's introduction was its open architecture system. Although this was the way the microcomputer market was developing, it was in sharp contrast

to IBM's normal proprietary products. This combination (IBM & open architecture) served as the catalyst for the entire microcomputer industry. IBM's participation legitimized the industry as one worthy of investment. Since IBM was the 'guru' of computers, IBM's participation also legitimized the use of the microcomputer for businesses. Finally, the open architecture and defacto standard allowed the proliferation of third party hardware and software developers. These third party developers generated a great deal of competition. Products improved and evolved as prices dropped. This led quickly to the domination of personal computers over all other types of computers.

When the IBM personal computer was introduced it was available with either the DOS operating system or the CP/M operating system. CP/M was the defacto standard for the 8-bit microcomputers popular at that time. Two major software producers of the time, Lifeboat and Microsoft, led the fight to have DOS accepted as the standard operating system ("The Microsoft/Lifeboat Battle Cry" 1982) for the personal computer. Although today DOS, Apple, and UNIX are the basic operating systems for microcomputers, only DOS serves the mainline business and home environment. UNIX is generally only used in a networking environment as it requires a lot of support (hardware and hands on). Its acceptance has been limited, since there is not a single standard. The Apple (Macintosh) standard serves two niches. The first accommodates those users who require a low learning curve. The second serves those users who require superior graphics capabilities.

Desktop publishing (Aldus' *Pagemaker*) was introduced on the Macintosh and takes advantage of both ease of learning and graphics capabilities. The introduction of desktop publishing software coincided with an increase in sales of the Macintosh machines. Even these advantages are beginning to erode as 1) the desktop publishing software is now available on DOS machines and 2) the graphics capabilities on the DOS machines are

improving rapidly. With the much lower hardware costs outside the Apple's closed environment it may begin to lose market share soon (Brett 1988).

This research is restricted to the IBM-compatible or DOS operating environment software. This market was chosen because it is the market with the greatest amount of third party software development. It is also the DOS format that businesses have widely adopted. The widest variety of software and uses exists within the DOS environment. Finally, the DOS machine has been widely purchased for both the office and the home.

Choice of Software Categories to Study

Table 3.2 lists the major software categories in the DOS environment. For the purposes of this study, only the software categories developed for business or 'industrial' markets are considered. That is, software developed as games or educational software is excluded from the study, since the purchase criteria for games and educational software may be quite specific. The specific needs of market segments may, therefore, prompt those sales. The perception and fulfilling of the needs of these groups may, therefore, drive the sales in these categories.

In the business software categories a general need seems to underlie each category. This makes each a viable product market for discussion and evaluation purposes as each category fills an underlying need for software. The first five categories listed in Table 3.2 (word processing, spreadsheets, graphics, databases, and communication packages) are the largest and most widely accepted categories of business software. Two other categories that are sometimes referred to are the integrated packages and desktop publishing. The software best suited to test the entry strategy performance model comes from these seven categories.

Definition of Product market and Choice of Product market(s)

Empirical testing of the entry strategy performance model requires choice of one or more product markets from which the test would be most

Table 3.2 Microcomputer Software Categories

Word Processors*
- -specialized
- -full service
- -entry level/light users
- -add-ons: spellers, thesauruses, grammar checkers, and desktop publishers

Spreadsheets*
- -the programs themselves
- -the add-on packages for additional functions

Graphics*
- -business graphics: charts, pies, etc.
- -CADD : low end such as Logicadd; high end such as Autocad
- -specialized applications, e.g., mapping programs
- -paint programs

Data Base Programs*
- -the programs themselves, e.g., DataBase III Plus
- -add-on packages

Communications Packages*

Integrated Software (word processor, spreadsheet, graphics)

Project Scheduling/Project Management

Languages/Compilers
- -Fortran
- -C
- -Pascal
- -Cobol
- -Basic
- -AI
- -Add-ons: translation programs

Statistics
- -general packages --large price variance
- -specialized packages

Windowing

Forms

Financial Accounting

Operating Systems
- -DOS
- -Unix
- -Macintosh
- -Apple

Disk Management/Utilities: Add-ons for Operating Systems
- -backups
- -optimizers
- -recovery programs
- -TSRs/PopUps
- -Shells

Networking

Copy Breakers

Font Programs

Entertainment/Games

Personal Asset Management

generalizable. Each of the seven business classes of software represents different user needs and sometimes different users. Each business software category, therefore, represents a different product market. It makes sense to study each category separately. With unlimited time and unlimited resources, replication with all seven classes of business software would provide the strongest test of the model. Examination of all seven classes of software is, however, beyond the scope of this dissertation. The entry strategy performance model is first tested in the

word processing product market (Chapters 4 and 5). This test is replicated in the business graphics software category (Chapter 6).

Word processing is the best product market to study for many reasons.

> 1) It is the most widely used and accepted category. It is not software for microcomputer gurus but for anyone who writes. The software, for the most part, is not hardware dependent and can operate on any DOS-compatible machine with virtually any printer.
>
> 2) The product is very important to its users.
>
> 3) It is the largest selling class of software.
>
> 4) It is the most competitive class of software. This has allowed rapid development of the product and the product market.
>
> 5) There is much information available for this class of software, more than for any other class of software. 6) Measurement issues can be resolved in this category of software because the product market is so developed.[1]

These reasons are discussed in more detail in the next few paragraphs.

As the price of hardware has dropped over the years a computer and a word processing program are accessible not just to large businesses but also to small businesses and homes. The importance of the word processing category of software is supported by the following two quotes from the industry.

> More PC Magazine readers rate themselves as proficient or power users of word processing programs than of any other category of software. We surveyed our readers and were impressed by how important they consider word processing. It stands to reason, though. The personal computer has had more of an impact on how we put words on paper than on any other applications area. Also, word processing is one of the fastest-changing applications area. (Machrone 1985, p. 59)
>
> No class of software is bigger or more widely used than word processors. A word processor is every beginner's first software purchase and every power user's daily computer tool. Thus, more word processors are in use on PCs, by a variety of users, than any other type of software product. (Dickson 1986, p. 93)

Because of the widespread need for word processors, more information is available for this category than for any other. For example, although the introduction of the microcomputer into businesses began with the

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[1] Measurement issues are addressed in detail in the next chapter.

availability of spreadsheets on Apple computers, there is little comparative information available for spreadsheets. *Lotus 1-2-3* dominated the DOS market within a few months after its introduction. There were few real competitors for years and no review articles rating many spreadsheets. The first comprehensive review for spreadsheets was about six years after *1-2-3*'s introduction, too late to use as a measure for entry strategies.

The word processing category of software is the most competitive market. Basic user needs are similar. Manufacturers frequently upgrade their products, offering new features and frills to differentiate their product from their competitors'. The product improvements generally do not result in increased prices because of the intense competition in this product market. Although more difficult to write and upgrade, word processors typically sell for one-half to two-thirds of the price that spreadsheets and databases do (Seymour 1988).

> The number and variety of products to fulfill this incredibly wide range of needs has (sic) made word processing the competitive market in PC software. As a result, no one product dominates that market the way Lotus Development Corp.'s *1-2-3* holds sway in spreadsheets or Ashton-Tate's dBASE product line dominates database management. (Dickinson 1986, p. 93)

Word processing packages are, for the most part, not hardware dependent. Most word processing packages run on all DOS machines. Also standard text can be printed, using ASCII, on virtually any type of output device from impact printers, to dot matrix printers, to laser printers. More sophisticated word processors include drivers for specific printers to allow the production of more characters and figures. This is unlike some categories which require special hardware to view the results. Desktop publishers require high resolution graphics cards, monitors, and printers.

Finally, investigation of entry strategies requires the operationalization of the general research model into a specific research model for the industry being studied. This process is detailed in Chapter 5. For

all seven classes of software, all the predictor constructs could be operationalized with the same measures. However, not all the other measurement issues are as easily resolved for each of the product classes. Specifically, product-market definitions and performance date measurements are more difficult to determine for some of the software classes.

Delineation of product-market boundaries is necessary to establish who the competitors in the market are. Each competitor is a case to be included in the analysis. Clear product-market boundaries do not exist for integrated packages (e.g., *Lotus' 1-2-3*, the most popular spreadsheet today, was originally considered an integrated package) and are very fuzzy for the database packages. The packages labelled as integrated packages generally include anywhere from two to five of the first five categories of business software listed in Table 3.1, making direct comparisons difficult. Similarly, databases, unlike word processing, do not address a common need. PC Magazine in 1984 published seven review articles for seven varieties of databases. Several of these database classifications could be used for businesses. Many of the databases changed categories by the time the entire review series was completed. For both databases and the integrated product packages the product-market boundaries are unclear.

The widespread adoption of word processing combined with the very competitive market has allowed the product market to develop rapidly. Establishment of the appropriate timeframe for the measurement of performance is, therefore, straightforward for this class of software. (See the performance date discussion in the next chapter.) The product market has been around long enough that the market has begun both to mature and to change its boundaries.

As the preceding discussion indicates, the word processing product market is an excellent market for a test of the entry strategy performance model. Its rapid growth in the last few years makes data collection possible. Not only are the necessary data measurable in this industry, but the industry's characteristics mean that the results will be gen-

eralizable to other product markets. The product itself, although a business product, is used by millions of people, both in the business world and in their homes. The product is not a niche product to satisfy only a small unique customer base. It is a widely adopted product--by virtually all who use personal computers. (A detailed description of the business graphics product market is provided in Chapter 6.)

The business graphics software, although not as widely used as word processing, is also used in a large number of businesses. It is no longer enough just to provide facts and figures; they need to be provided in a form that allows others to understand and use the information. This market has been chosen to replicate the test of the entry strategy performance model, not just for these reasons, but also for measurement reasons. First, the boundaries of the product market have been identified in a number of software reviews. Second, a large enough number of graphics packages have had comprehensive reviews over a long enough period of time that a sufficiently large number of observations can be generated to test the model.

Studying only one product market limits the number of cases that can be included in a study. This is the case with limiting this study to only the word processing product market in the microcomputer software industry and limiting the replication to only the business graphics category of software. The small number of observations (under 50) available in each market take in all the major entrants into those markets. Therefore, there is no concern that the 'sample' is not representative of the market. The only remaining concern with a small sample is whether or not statistical analysis is possible. PLS was chosen as the preferred method of data analysis because it allows structural equation analysis with small sample sizes. As the next section clearly indicates, there are sufficient cases in the word processing market to test the entry strategy performance model. (The business graphics product market is discussed in Chapter 6.)

Analysis Technique: Causal Modeling: Partial Least Squares

Structural equation modeling allows the researcher 1) to examine causal links among a set of constructs, 2) to use multiple measures for constructs, and 3) to assess simultaneously both the structural and measurement components of a model. All are strong arguments for using structural equation modeling to examine the entry strategy model.

It has long been recognized that many factors affect the performance of a new entry but, as noted in the literature review, prior research has examined each construct one at a time. This has at times led to inconsistent findings. Structural equation analysis analyzes the entire model. This is superior to testing each hypothesis in isolation because it is the system of constructs that is associated with performance. When the impact of single constructs, such as timing of entry, is examined in isolation, research results may vary from one study to another. This could happen because other variables affect performance through the single construct (indirect relationships) or the single construct affects a third variable which directly impacts performance or there is a spurious relationship. Causal links between the constructs can be more fully specified and tested in structural equation modeling.

Another factor that causes research results to vary from one study to another is that the same constructs are measured by different variables. The different variables may capture only a portion of the domain of the underlying construct. Multiple measures of a construct allow the researcher to capture more fully the domain of a construct. Structural equation modeling allows the researcher to use multiple measures. Multiple measures are available for most of the constructs in the entry strategy performance model in the microcomputer software industry.

Given that structural equation modeling is the appropriate technique for analysis in this dissertation, one then must choose between LISREL and Partial Least Squares Analysis (PLS). Both provide all the benefits listed previously in this section. Some key differences and data

requirements between the two techniques make PLS the appropriate choice for this research project.

Wold (1982, p. 53) explains that LISREL and PLS are complementary not competitive techniques. The primary difference between the two techniques is their purpose. The purpose of LISREL is to examine the total model using maximum likelihood estimations. PLS (Wold 1985; Lohmöller 1981) has as its goal the minimization of residual variance. That is, the objective is to estimate the variances explained (of either observed or unobserved variables). It is estimated using iterations of ordinary least squares. The different estimation procedures result in different data requirements and results. It is through these considerations that the choice of an appropriate structural equation analysis technique was made.

PLS is the structural equation modeling analysis technique of choice for several reasons. LISREL comes to the fore when parameter estimation is of primary importance.[2] PLS comes to the fore when prediction is most important. The purpose of this study is to predict the performance of the entry strategies. The objective of PLS matches the study objective.

Secondly, LISREL should only be used when the theory and the measurement underlying the research model are well developed (Fornell and Bookstein 1982). Unless this is the case, given a large sample size and few restrictions, it is possible to reproduce a covariance matrix in a model. As a model or theory is refined and developed more restrictions

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[2] "By a general ML [maximum likelihood] theorem the LISREL parameter estimates have optimal accuracy, asymptotically, in large samples" (Wold 1985, p. 233). PLS, on the other hand, provides estimates both for the parameters of the model and for the case values of the latent variables. "These estimates are consistent at large" (Wold 1985, p. 234). Thus hypotheses may be tested with both analysis techniques recognizing that each has a difference in emphasis.

The emphasis in PLS is the predictive relevance of the model while the emphasis in LISREL is on acceptance or rejection of the model. "ML poses hypothesis testing as a yes or no question; when the sample is too small no validity of the model is reached, and if sufficiently large the model is always rejected" (Wold 1985, p. 239). PLS is appropriate for this dissertation as it allows an evaluation of both predicitive relevance and hypothesis testing.

are imposed on the relationships between the constructs. This is because more is known about what relationships should and should not be present.

PLS (as opposed to LISREL) provides a conservative test of the model parameters. This is important when both the model being examined and the measures being used are for the most part exploratory, as they are here. PLS does not go beyond the data. At the worst, if the measures are valid but have low correlations, PLS parameter estimates would be biased downward while the LISREL estimate would be closer to their true values. On the other hand, "if one had reason to doubt the accuracy of the theoretical model and/or the validity of the indicators[3], the LISREL estimate would be exaggerated and more credence could be given to the PLS estimate" (Fornell and Bookstein 1982, p. 451).

It has been detailed throughout this dissertation that in only one prior study (Green and Ryans, 1990) has anyone empirically examined the system of interrelationships between entry strategy and performance Although much has been written and researched about many of the components in the model, this is not true of all the model components or the entire model. Given these circumstances Fornell and Bookstein (1982) would argue for the use of PLS over LISREL.

Thirdly, whenever structural equation analysis is considered, all theoretical information should be incorporated into the model for the most accuracy and power in statistical analysis. LISREL is best when the models are simple and the number of parameters is small. Wold (1982, p. 53) states that as "...the problems become more complex, the stringent frequency assumptions of LISREL become less tenable, and the optimality

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[3] LISREL is more "forgiving" with poor measures. That is, it "allows for imperfect measurement by assigning surplus variance to the unobservables" (Fornell and Bookstein 1982, p. 312). The surplus variance may have arisen because of measurement error. Assignment of the variance to the unobservables, therefore, could give false confidence in the results. "Part of this difficulty is that a large number of unobservables may have the same pattern with each other yet have little or no relationships with each other." Not only is there the problem of several possible interpretations, but also the possibility of improper loadings with no possible interpretations (Fornell and Bookstein 1982).

aspirations become more or less illusory." The entry strategy performance model includes several constructs (product-market characteristics, magnitude of investment and competitive positioning) which would each be divided into one or more uni-dimensional constructs when the model is fully operationalized. It could also require the addition of one or more constructs which might be important in the studied industry, e.g., magazine coverage in the microcomputer software industry. The operationalized model in the microcomputer software industry (Figure 4.4) includes fourteen latent constructs and thirty-seven manifest variables. There are a total of 59 parameters to be estimated. (See the section near the end of this chapter called "Word Processing Sample Size" and the next chapter for more details.) Because this is a relatively complex model PLS would be preferred over LISREL for structural equation analysis.

Fourthly, the data requirements for PLS analysis are less stringent than for LISREL. The data requirements for LISREL are quite demanding: multi-normality, interval scaling, and large sample sizes. None of these is required for PLS. Although it is likely that the data are 'normal', there are no guarantees. PLS allows estimation of the parameters, even if the data are not normal. (Significance tests of these parameters would still require 'normal' data.) Also, at least one construct will be measured with nominal measures (magnitude of distribution investment). As PLS allows for this type of measure, this construct can be included in the model.

An adequate sample size within the microcomputer software industry is a primary concern. For each of the potential product markets for study none would result in over fifty observations. This would be too few cases for LISREL estimation. PLS has proven to be robust with small sample sizes (Wold 1985, p. 240). (The adequacy of the available observations for PLS analysis is discussed in detail at the end of this chapter.)

Finally, Fornell and Bookstein (1982, p. 289) state: "The frequent occurrences of improper and uninterpretable solutions advise against the

use of LISREL unless its assumptions are verifiably true and its objectives consistent with the objectives of the study; and, when they are not, PLS presents a viable alternative." In this study, PLS is certainly the structural equation modeling technique of choice.

Number of Cases Required for PLS Analysis

Determination of Appropriate Sample Size

Almost every article about PLS indicates that one of the primary advantages of its usage is that it provides viable results with a small sample size. This raises several questions which, for the most part, have only vaguely been addressed in the PLS literature. How small is small? Is a sample size determination possible prior to data analysis--as is power analysis for first generation statistical methods? And how can one tell if the sample size is large enough?

Examples of PLS analyses with a small sample size. Several studies have been reported in the literature that have used PLS with what would commonly be considered a small sample size. In 1982, Meissner and Uhle-Fassing established a PLS model with 21 manifest variables, five constructs, and only 13 cases. Bristor (1987) reported a sample size of 50 with 31 indicator variables (the original model had seven latents; the revised model had six). The most extreme case reported was a study by Wold (1980). He had 27 manifest variables, two constructs, and only ten cases. In this regard he later stated "It can happen that there are more indicators than cases under observation; even in this extreme situation PLS provides explicit estimates for the case values of the latent variables" (Wold 1982, p. 53).

Part of the explanation for the ability of PLS to work under these conditions has to do with the consistency of PLS estimates. "As the sample size and the number of indicators for each latent variable increase, PLS estimates tend toward the true values" (Hui and Wold 1982, p.

130). In other words, an increase in sample size or manifest variables improves the PLS estimates.

How small is small?/Is the sample size large enough? Unfortunately, few authors directly address how one decides what is a large enough sample size. The creator of PLS modeling, Herman Wold, provides some hints.

Wold (1985) cites the example of a PLS model with ten cases (countries who experienced economic sanctions) and 27 variables (factors which may influence the outcome of the sanctions) which he had originally reported earlier (Wold, 1980). In "Systems Analysis by Partial Least Squares" (Wold, 1985), he discusses the results. He indicates that promising results were obtained by developing a model with one explanatory latent variable (LV) estimated with all formative variables (Mode A). The sample size was sufficient as 1) the results coincided with the original researcher's expected case values and 2) the Stone-Geisser test indicated a "...substantial degree of predictive relevance" (Wold 1985, p. 241) with $Q^2 = .42$. In reference to this same analysis, Lohmöller states "Wold demonstrates by means of the blindfolding technique (similar to the jackknife technique) that PLS collects relevant information into LVs, even when there are three times more variables than cases" (Lohmöller 1982, p. 13).

Bristor (1987) suggests examination of the number of iterations and the jackknifing estimates. If the sample is too small, she says that convergence may not be achieved by the 500th cycle. She goes on to state that stable and significant jackknifed estimates are another indication that the sample size is large enough.

In a summary of this section the indicators of sufficient sample size are the following: 1) the results coincide with the researcher's expected latent variable scores; 2) there is a substantial degree of predictive relevance as indicated by the Stone-Geisser test; 3) estimation converges quickly (less than 500 iterations); and 4) the jackknifing estimates are stable and significant.

Can the necessary sample size be determined prior to estimation?

As in most types of statistical analysis the larger the sample size, the closer (if the sample is representative) the results will be to the true values in the population. This is also the case for Partial Least Squares Analysis. However it is also the case that, given a set sample size, increasing the number of indicators for latents will also produce results closer to the true values. A researcher, using PLS, can, therefore, provide more accurate estimates with the same sample size, than a researcher using first generation statistical analysis techniques; "...the more indicators for a LV in a soft model, the better" (Wold 1982, p. 27). Increasing the number of measures collected for each construct may be easier than increasing the sample size.[4]

If one's chosen population for study will generate only a relatively small number of observations and structural equation modeling is desired, Partial Least Squares analysis is preferred to LISREL. LISREL uses maximum likelihood (ML) estimation methods which require a large number of observations. PLS, on the other hand, needs fewer cases because its calculations are done via ordinary least squares. Wold states, "In contrast to the ML validation methods there is no need for a large number of observations, N, and if N is small, the information from the SG test is enforced if the LVs have many indicators" (1985, p. 240).[5]

Some authors have suggested using a common rule of thumb from regression--ten cases for each independent variable in the regression (Bristor 1987, Barclay 1986). This regression rule of thumb says that for each parameter (path coefficient in regression) estimation ten cases are required. Transference of this rule to PLS is predicated on the fact that a series of regressions is the basis of the PLS algorithm. It has been

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[4] This is the case in this dissertation. There are a limited number of software products in each software category or product market. This is one reason the researcher developed multiple measures for all constructs.

[5] The Stone-Geisser (SG) test is a measure of predictive relevance used with PLS.

suggested that the rule be applied to the regressions equations which would be present in PLS analysis. Direct application of this rule implies the need for ten cases in the block or regression with the largest number of parameters to be estimated. Hence, the more parameters, the larger the number of cases needed.

While this general rule makes sense, its direct application to PLS Analysis tends to overestimate the number of cases required for analysis. This arises for two reasons. First, the researcher can choose whether each latent variable is formed from formative or reflective indicators. (See the appendix for a description of the differences.) Secondly, the results (parameters and loadings) from PLS analysis are developed from a series of iterations.

When there are formative indicators for a latent variable, the indicators "estimate" the value of the latent variable via a multiple regression. When the indicators are reflective of the latent variable, there exists, for estimation purposes, a series of simple regressions between each reflective indicator and each latent variable. This means the data requirements with the general regression rule could differ depending upon whether the constructs had reflective indicators or formative indicators. It would only be the same if the most complex regression in the PLS analysis was in the structural equations rather than in the measurement model. If a researcher has all formative indicators his data needs may, therefore, appear to be much higher than if some or all were reflective.

This application of the general ten-for-one regression rule of thumb must also consider the iterations involved in PLS analysis. The iterations, in effect, allow the data to be used as input for more than just the nearest regression equations for which they are involved. Hui and Wold (1982) examine the consistency at large of PLS estimates. They conclude their article by stating that "as the sample size and the number

of indicators for each latent variable increase, PLS estimates tend toward the true values" (p. 130).

Nowhere in their article do Hui and Wold indicate that as the number of indicators increases, so must the sample size (as would be required with formative indicators with the straight application of the regression ten-for-one rule). They say "...the estimates will in the limit tend to the true values as the sample size N increases indefinitely, while at the same time the block sizes increase indefinitely but remain small relative to N" (p. 123).

Hui and Wold (1982) are sensitive to the fact that the more data input there is for estimation of a parameter, the better the estimate. To illustrate why PLS produces better parameter estimates than case value estimates they provide the formulae necessary to calculate the number of data inputs actually used to produce both the case values and the parameter estimates. As PLS is an iterative procedure the number of data inputs for each parameter estimate is higher than the number of cases or observations.

The estimates for parameters are better than the case value estimates because "the data input per unknown to be estimated is usually much larger for the parameters α than for the case values η_n, ξ_n of the latent variables." The data input per unknown for the case values is calculated simply as the size of the block, K, (i.e., the number of manifests for the latent). The data input per unknown for each parameter is calculated as BKN/Q,

where B = the number of blocks
K = the size of the blocks--all the same size
Q = the number of parameters (measurement: loadings or weights and structural: path loadings)
N = the sample size

The formula Hui and Wold presented applies only to instances where all blocks or latents have the same number of manifest variables. This is

generally not the case with 'real world' data. If one allows the block size to vary, the formula for the data input per parameter would become:

$$\frac{(\sum_{i=1}^{b} K)N}{Q}$$

The following chart applies this formula to the small sample cases listed in the beginning of this section. As one can see from examining the final column, in all cases there were at least 10 data inputs for each parameter estimated, except for Wold's study which had almost ten (9.4).

Table 3.3 Number of Cases Required for Prior PLS Studies

Research Project; Date	Number of Cases	Number of Manifests	Most Manifests on One Latent	Largest Number of Manifests on a Formative	Data Inputs Per Parameter
Wold (1978, 1980)	10	27	14	0	9.4
Meissner & Uhle-Fasing (1982)	13	21	7	0	10.5
Bristor (1987)	50	31	6	6	40.1

This formula is, therefore, recommended for use in estimating the minimum number of cases required for a PLS analysis. The formula established the number of data inputs available from a data set for each parameter to be estimated. If 'ten data inputs per parameter' is used as the rule of thumb, then if the number is larger than ten, there will be sufficient data to test the model. Alternatively, this formula could be used to solve for the minimum number of cases required by substituting ten (from the ten-for-one rule of thumb) for the data inputs per parameter and solving for the only unknown, N.

Word Processing Sample Size

For the specific research model, which is fully defined by the end of the next chapter, the number of data inputs per parameter is estimated. This is done for the first class of business software to be examined: word processing. There are a total of 37 manifest variables included in the original research model tested in Chapter 5 (Figure 5.1 and Table 5.1). There are 39 word processors in the data set. There are 60 parameters to be estimated: 37 loadings and 23 path coefficients. It is calculated as follows:

$$\frac{(\sum_{i=1}^{p} K)N}{Q} = \frac{(37*39)}{(37+23)} = 24.05$$

There are 24 data inputs for each parameter to be estimated. This is more than twice the recommended level. The data collection and analysis are, therefore, constrained to the word processing class of software. After the analysis is completed in Chapter 6, a post hoc analysis assessment of the sample size is reported.

Conclusion

Enough data are available about the microcomputer software industry to provide an empirical test of the entry strategy performance model. The PLS structural modeling technique allows the analysis of these data. There will be two phases of testing. Phase one has been described in this chapter. It is a test of the entry strategy performance model in the word processing product market of software. The operationalization of the constructs is discussed in detail in the next chapter, with the result following in Chapter 5. In the second phase of testing the model is examined in the business graphics software category (Chapter 6).

CHAPTER FOUR
OPERATIONALIZATICN IN THE SOFTWARE INDUSTRY[1]

In this chapter the entry strategy performance model is translated into a specific research model for the microcomputer software industry. After the measurement issues are resolved, the research model of entry strategy performance in the microcomputer industry is described in detail. The adaption of the entry strategy performance conceptual model (Figure 2.2) to the microcomputer software industry is discussed. Each construct and its measures are detailed for the microcomputer software industry.

Measurement Issues

Date for the Performance Measure

Articles which suggest that strategies need to adjust to changing market conditions imply that the original entry strategy will not be good forever (e.g., Gilbert and Strebel 1987, Olleros 1986, Teece 1988). A good entry strategy should get the product off to a good start. It should set up the product with competitive advantages that are sustainable for a long time. A good entry strategy results in good performance in the long term, but not forever. A poor entry strategy does not necessarily lead to poor long-term performance, but it will make the achievement of a good long-term performance more difficult.

It is much more difficult to change an image than to create a new one. This is why many authors, e.g., Ghemawat 1986 and Lieberman and Montgomery 1988, refer to first-mover advantages. It is, therefore, important to establish a date for the measurement of entry and of performance which is neither 'too soon' nor 'too late'.

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[1] Note: this discussion focuses on the word processing product market. The methodology and the measures are, however, applica le to the other business categories of software. Minor differences arose when applying the operationalization to the graphics market. These are discussed in the Chapter Six.

Given the nature of business as a going concern with an uninterrupted presence in a product market, any cutoff date will be arbitrary to some extent. Within a single firm, different types of performance measures argue for different performance cutoff dates (e.g., the net present value of cash flows, short-term market share, and long-term profitability). When measures are made across many firms, the matter becomes more complex. What one firm may consider as a proper time horizon for measurement may be too long or too short for other firms, given their own goals, resources and time frame. A researcher attempting to measure relative success must choose some comparison point in time.

There are analogues in other research areas in marketing to the longitudinal measures that are required for performance, that is, studies which measure performance after some initial action. Examples of these include: 1) advertising effects and marketing mix effects (de Kluyver and Blodie 1987), 2) success or failure of new products (Link 1987), and 3) market share in Japan after new product entry (Ryans 1988). There is little discussion in the literature (or these studies) regarding the cutoff date chosen for the performance measure. Apparent reasons for the chosen performance measurement dates include the following: 1) Convenience. A data set is available with performance already measured. 2) An arbitrary data or recent date. A single date is usually specified. With questionnaires this is generally a recent date. 3) A set period of time after an event, for example, six months after some event has occurred.

Figure 4.1 shows the market shares of the top five word processing products for the years 1982 through 1988. As happens in many emerging product markets, market shares are volatile. An arbitrary choice for performance measurement could dramatically alter the results.

Unlike most prior entry strategy research, the date of measurement of performance in this study is not constrained by data availability. Both market share measures (installed base and projected purchases) are available for each year since the IBM PC was introduced. Software Maga-

zine has supplied these data for the years 1982 through 1988. Also, citations can be tallied for any time frame from both the ABI/Inform and the Microcomputer Index databases. The date of the performance measure can, therefore, be based on market and theoretical considerations, not data availability.

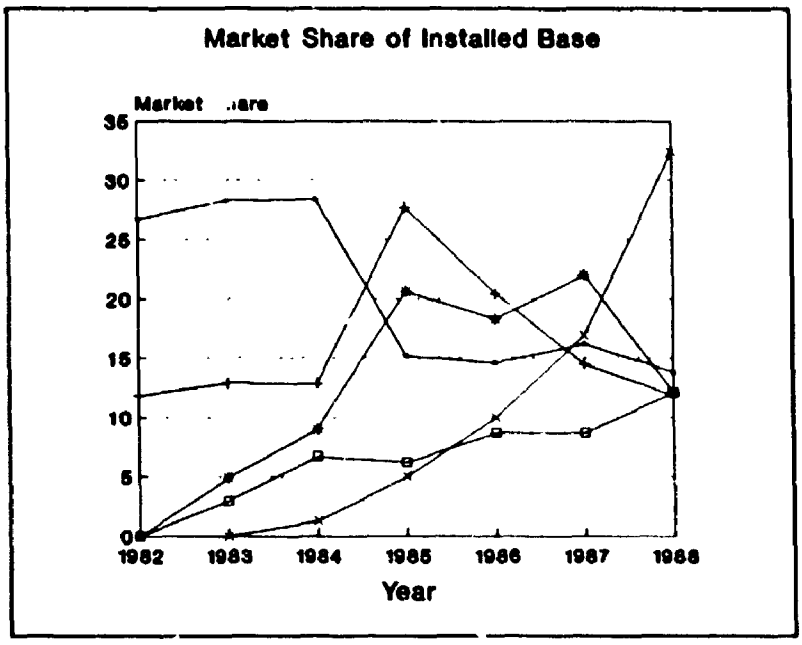

Figure 4.1 Word Processing Market Shares 1982 through 1988

Because the data are readily available for any chosen date, it is not necessary that the same date be used for different software product markets. For entry strategy research the time frame chosen must be at least long enough for performance to be measured. On the other hand, it must not be so long that the market conditions have changed extensively. With considerable market changes, the original entry strategy may no longer be applicable and may have been replaced by a modified or brand new marketing strategy.

There are two logical points in time at which to measure performance. In terms of the product life cycle, the best point at which to measure performance would be during the transition from the growth stage to the maturity stage of the product life cycle (i.e., where growth in the market is increasing at a decreasing rate) or at the beginning of the maturity stage. The second point at which performance measures should be taken is when the product-market definition begins to change. Under

this circumstance the entry strategy for the old product-market environment may not be applicable to the new environment.

It would not make much sense to measure entry strategy performance when there are still only a few competitors in the market and the market is still developing and changing, that is, while the product is still in the introductory or growth stage of the product life cycle. Anderson and Zeithaml (1984) suggest that as a product passes from the growth stage to the maturity stage and again to the decline stage of the product life cycle '...modifications in strategy between certain stages of the PLC are both prevalent and advisable" (p. 21). The market conditions change considerably from the demand uncertainty in the introductory stage, to the extensive product development and competitive activity that occurs in the growth stage while 'standards' and consumer expectations are developing, to the 'relative' calm in the maturity stage of the product life cycle. Market shares and profit performance are both likely to be more stable at this stage of the product life cycle.

A long time may pass between entry and the maturity stage of the product life cycle. The length of time depends on both the timing of the entry itself and the speed of evolution of the product market. The original entry strategy may have changed entirely as the market matured and new competitive conditions emerged. There would be some residual effect from the initial entry strategy, but it would be manifested in some type of competitive advantage (or lack thereof) such as: reputation for quality, service and pricing; established distribution channels; or low cost production. It is, therefore, the establishment of the original competitive positioning of the firm that determines entry success or failure. This original positioning will follow the firm later and may either help or hinder it. However, its performance will also depend on the ongoing strategic decisions and actions of the firm's management to either maintain or change the original positioning of the product.

Changing product-market boundaries dissipate, or render impotent, the importance of the original entry strategy. In the microcomputer software industry, product-market boundaries became blurred for word processing and desktop publishing software. During the early part of 1988 the major players in the word processing market introduced features into the major word processing packages that allowed the incorporation of graphics with the text. This changed the nature of these programs so that they became similar to, and superior to, the low-end desktop publishing packages available on the market at the time. These changes also made these packages substantially different from many of the other 'word processors'. They also became similar to, yet different from, the desktop publishing software. The products could now conceivably compete in either product category. For these reasons, for both the word processing and the desktop publishing categories of software, the performance measure should be taken at the end of 1987 that is, just before a potentially revolutionary change.

Specifically, performance should be measured before the introduction of WordPerfect 5.0 in the Spring of 1988 because its introduction and the changes in its competitors' products blur the distinction between the two software classes: word processors and desk top publishing. The date for the measurement of performance is the end of the prior year, December 1987. The only problem with that date is that WordPerfect's sales may have been somewhat depressed at that time as buyers decided to wait to purchase until the new version was released. However, it is just as likely that the entire program class of sales was depressed. Potential customers wanted to know if WordPerfect 5.0 could deliver what it promised. If this is the case, the announcement prior to release probably depressed all word processing sales and may have had little or no effect on market share--the primary performance measure to be used in this study.

The date for performance measurement, December 1987, for the word processing class of business software is supported by the following quote:

> As PC word processing approaches its seventh birthday, many of the industry's combatants agree that the war for the corporate PC word-processing software market is over.
>
> Most Fortune 500 companies have decided on their standard word processors, and from now on, "market shares of the vendors are going to stay pretty flat," Camilo Wilson, president of Lifetree Software Inc. of Monterey, Calif. (Pearlman 1988).

Entry Period

The entry strategy performance model postulates that the company's experience and sources of advantage, entry strategy (timing, distribution investment, advertising investment, and competitive positioning) and product-market characteristics (concentration ratio and number of competitors) **at the time of entry** affect the long term performance of the product. To test this model, measures need to be taken **at the time of entry** or during **the entry period.**

There are two issues here. What is the period of entry? At what point(s) in time should each of the entry measures be taken? In this section the entry period is discussed. The exact period to be examined for the operationalization of this model is discussed for each construct in the next section.

The period of new product entry in the microcomputer software industry is approximately six months. This determination is based on three facts. First the period of time from when a microcomputer software product is introduced to the time that it becomes outdated is very short. The industry is characterized by frequent updating of programs. When a new product is introduced a new 'version' or update is generally released within six months to one year. This update generally involves correction of any 'bugs' and the addition of features desired by the market and offered by competitors. Second, industry experts suggest that the entry period is six months.

Finally, six months as an entry period is supported by empirical analysis. In Figure 4.2 the software reviews, other magazine citations, and advertisements from the word processing product market are graphed

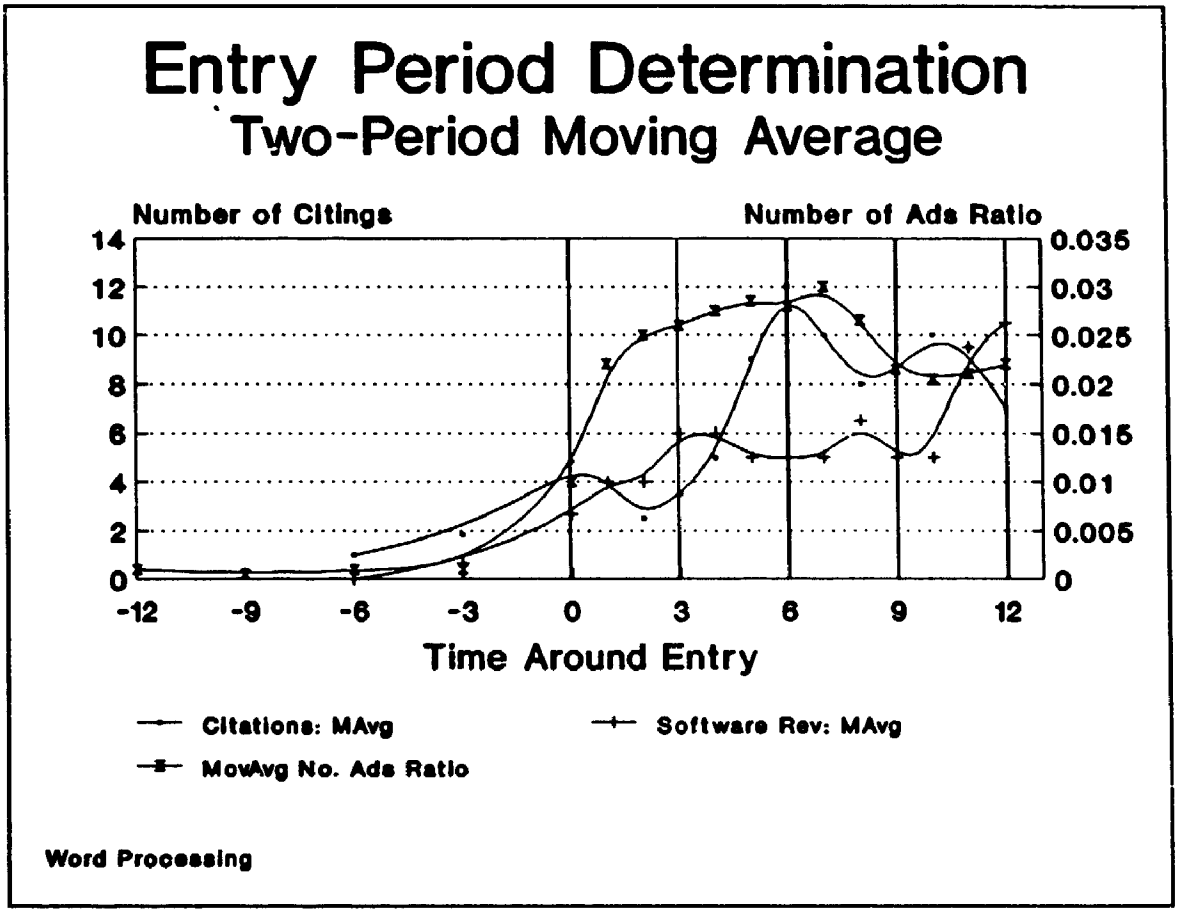

Figure 4.2 Establishment of Entry Period

with a two month moving average. A moving average was used for two reasons: 1) because smoothing the curves helps determine inflection points and hence the period of entry and 2) because carryover is important in this industry. Many of the magazines are treated as resource material to be used when making additional purchases. Readers go back to recent issues for information (articles and advertisements) on the desired products.

The figure shows that there are very few advertisements, reviews or citations before the month of entry. Citations peak about six months after entry. Citations reflect the media's, and presumably their readers', interest in new products. These data therefore strongly support a six month entry period.

Advertisements are the only measure in this analysis under the direct control of the firm. The advertisements peak about seven months after entry and then seem to settle to a lower maintenance level. As advertising contracts usually run for multiple issues, the carryover of the advertising peak to one month beyond the entry period is probably attributable to this fact. The advertising data, therefore, also support the six month entry period.

What is a New Product?

When is a product revision large enough to be considered a new product introduction as opposed to simply a newer model of the old product? This is a problem that has not been discussed in any of the entry strategy research reviewed for this dissertation. It is an important issue, however. As a market develops and matures, products also develop and change. In a longitudinal study or an archival study, such as this, where data are collected over time, this issue can no longer be dealt with in an off-hand manner. It must be addressed throughout the data collection process. For the results to be meaningful, it is necessary to have a clear rule by which a decision regarding the metamorphosis of an old product to a new product can be made. The following general rule was adopted in this research: when there is a major change in 1) the functionality of the product or 2) the target segment for which the product is intended, it can be said to have undergone a metamorphosis and is a new product. Implementation of this rule in the software industry is discussed next.

In terms of years, the amount of time elapsed since the beginning of the microcomputer software market has been short. Software products have evolved and changed over time. Software is not a physical entity in which one can observe differences. It is necessary to work 'with' the product to recognize and understand the changes or to rely on experts to test and report on the products in product reviews. Unlike other products, the

software industry has developed a convention to indicate the magnitude of any product revisions. This is probably because of the 'intellectual' nature of the product. Products are usually listed with a two-digit version number consisting of a numeral, a decimal point, and another number. The change made by a manufacturer from version 4.1 to version 4.2 of a product is much smaller than would be the change from 4.2 to 5.0. A change in the second digit represents minor changes or modifications to a product. A change in the first digit represents major product change(s). The new product is the old product, hence the same brand name, but a better or much improved, product.

Even with major changes the product has the same brand name and is marketed to the same consumers. The old version of the product is (generally[2]) not available for sale. The consumer cannot choose between one version of a product and the next version of the product if he/she is going to make an initial product purchase. As the consumer does not have a choice between the products, the changed product is not a new product. It is simply a modification of the old product. All the version changes (major and minor) are not, therefore, considered new product introductions.

A related issue is whether measures (e.g., competitive positioning) should be taken both during entry and when the product is updated. Much of marketing literature is devoted to decisions marketers can and should make about existing products. Additional measures, between entry and the time of the performance measure, could possibly capture some of these managerial decisions. This research, however, focuses on the entry strategy and its impact on the long-term performance of the product.

For this test of the entry strategy performance model, all changes to the product and the marketing strategy in the period between the entry measures and the performance measures are ignored. The underlying

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[2] IBM is an exception. They marketed several versions of their word processor, DisplayWrite, at the same time.

assumption in this approach is that the later changes and revisions are minor compared to the initial entry strategy. That is, the changes made are simply 'updates' and refinements of the original strategy. This concept is implicit in the operational model (Figure 2.2). This approach provides a conservative test of the efficacy of the entry strategy because the intervening management approaches could either support or alter the original entry strategy. If these intervening actions are more important than the entry strategy, the strength of the relationship between the entry strategy and performance could show up as weak or non-existent.

In summary, in the microcomputer software industry, once a brand name is established for a product it is considered a single product. The only exception is if there is a major change in the functionality of the product or its target market. The entry strategy and market conditions are measured at the time of entry and the performance measure at a later date. No intervening measures are considered.

Multiple Entries by the Same Firm

As noted in the last section, generally when firms improve their top-of-the-line product, they come out with a new *version*. Version 4.2 of *WordPerfect* replaces version 4.1, etc. With only one 'business' word processor on the market, it is, therefore, included in the data set as a single product. Only a few firms kept the old version of their product on the market and also entered a new and improved version of their product on the market. *MultiMate Advantage* was introduced alongside *MultiMate*, while *Volkswriter 3* was introduced alongside *Volkswriter Deluxe*.

In the word processing category, over time some of the major firms also brought out multiple word processing packages. Firms which did this are IBM with its *Displaywrite* series, *WordPerfect* with *Personal WordPerfect*, and Micropro with *Easy*, *WordStar*, and *WordStar 2000*. Except for IBM (who entered with both a personal and a business word processor

simultaneously), the firms generally entered the market with their 'business' class product and then later introduced a reduced version for new computer users (*Personal WordPerfect* and *Easy*).

For the purposes of this study it was decided that the firm's business class word processing offerings would be treated as one product. The date of entry for the first business product is the date of entry used. The first word processing review after the original date of entry that included a 'business' class word processor is included as the competitive positioning measure. The decision rule adopted is as follows. If, by the time of the first review, the company had entered the market with multiple 'business' class word processors, the review for the most upscale product would be used. Not all the products of the same company would be included. As it turned out, there were enough reviews in this market that only the first business offering of each company was included in the first reviews after its entry. (Later reviews contained multiple business word processors from a company.)

The performance measures (both the market share and the citations) are for all the business class word processors from a firm. In the case of Micropro the citation count is, therefore, for both *WordStar* and *WordStar 2000*. Likewise the market share is for Micropro, not for each product individually. This original entry set up initial expectations and positionings in the mind of the customer. The firms which had multiple entries all tried to leverage off the brand name of the entry product. All the later, multiple entries used some version of the original entry product's name. The only downside to this decision is that the count in the citation index may over-represent the real market acceptance of a firm's products because there seems to be more publicity when a 'new' product is released than when a new version is released.

Choice of Specific Products in Product Market(s) Studied

The sample must meet the following conditions:

1. All the 'big' successful players in the market must be included. Random sampling may omit some of the successful firms. Currently, there are over 300 commercial word processors for sale. In this software category, as in the other major business software categories (graphics, databases, and spreadsheets), five or fewer firms control one-half to three-quarters of their markets (Howard & Kunkel 1988). Therefore, the sample selected must contain all the top sellers in a product market.

2. The sample should also include some 'less successful' products.

This is necessary to have a wide range of 'success levels' in the performance construct. Without sufficient variance it is not possible to tell why hypotheses about variations in performance levels are not supported. It may be because the model simply does not explain performance. If the full range of the performance construct is not captured, there would not be enough power to avoid rejecting true hypotheses.

3. The required information is available.

The positioning measurements are critical for this model. It is essential that competitive positioning information is available for all the products. Therefore, the products examined in comprehensive, unbiased reviews provide the basis for the sample. PC Magazine has a reputation for conducting such reviews. They have undertaken reviews for all major categories of business software. Five such comprehensive reviews of word processing were published between the introduction of the IBM standard personal computer in August 1981 and 1988. These reviews were done in 1982, 1984, 1985, 1986 and 1988.

The last three reviews were comprehensive and provide information for all the competitive positioning measures included in this study. Initially, all word processors included in these reviews were considered for the data set. The 1984 review was missing a limited amount of data,

which could be gathered elsewhere; hence all the word processors from it were also initially included in the data set.[3]

Many of the word processors reviewed were not suitable for the business microcomputer software market. The reviews in PC Magazine indicated which programs were more appropriate for just the home market. All the programs identified as primarily for the personal market were temporarily removed from the data set. If any of these showed up in any other review as appropriate for the business environment, they were placed once again in the data set. Historical records were also examined. If a product had been targeted for the business market when it was introduced, but did not fulfill the needs of that market by the time of its first comprehensive review, it was still included in the data set. By means of this method, all IBM word processors targeted for the business or professional market and reviewed by one of the PC Magazine reviews are included in the data set.[4]

What Measures Should be Used for the First Entrant?

When a product is the first product into a market, it is not possible to have relative measures as there are no competitors. Comparison cannot be made for the competitive positioning measures or the magnitude of investment measures. It is also not possible to examine the product-market characteristics at the time of entry because there is not yet a

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[3] The measurements for each construct are detailed later in the chapter. Where data were missing from the 1984 review, explanations for the substitutions are provided.

[4] The only exceptions to this discussion are as follows. Two word processors in the data set entered the market during 1987, the performance year. Citation and review data are, therefore, for the year of the performance measure and the next year. This does not make sense. *Q&A Write* and *Varsity Scriptsit* were removed from the data set. Also *NewWord* entered the word processing market in August 1984. MicroPro bought out the firm in 1986 and used this program as their upgrade for their *WordStar* program. As *NewWord* was no longer on the market in 1987 it too was removed from the data set.

product market. No growth and no concentration ratio were apparent just prior to entry since a market did not exist.

One measurement solution is to drop the pioneer entrant from the data set because there would be too much missing data. Conceptually, this elimination causes problems because so much has been written and professed about the pioneer advantages that accrue by just being the first entrant into a market.

Another alternative is simply to assign an average value for those dimensions to the pioneer products. This would allow the pioneer products to remain in the data set. Unfortunately, this average value may not be correct at all for the first entrant. Alternatively, since the first entrant is the only one on the market, it could be assigned specific values for each of the constructs (e.g., infinity for growth, 100% for concentration, 0 for number of competitors, 0 for market size, the maximum possible for all investment variables, and the maximum possible for all relative positioning measures). The advantage to this method is that these are the 'true' values at that particular instant in time. The reality is that very shortly after the first entry most markets change from a monopoly market to a market with multiple entrants. Also the model being tested in this dissertation explains success in terms of competitors, not according to a monopoly environment. For these reasons what is important is how the first product to enter the market compares with its competitors.

Measurement as soon as possible after entry is the best alternative for measuring the pioneer entrant. The positioning dimensions are measured at the first product review where more than one product of the same product class are reviewed. These are true relative measures which reflect the early status of the market and its development. Measures for the product-market characteristics are also either available by the first review or could be calculated based on the data for the first few entrants.

Research Model in the Microcomputer Software Industry

Figure 4.3 revises the entry strategy performance conceptual model for the microcomputer software industry. It is the general conceptual model (Figure 3.3) with an additional construct which may be important in the software industry: magazine coverage. In the microcomputer software industry, as new products come on the market, many of the industry publications either announce the product or review the product. Also, 'standard' products are often referenced or discussed in articles about other products. These citations are essentially free advertising or, more precisely, publicity. This construct has been added to the model to test whether this additional exposure at entry impacts long-term performance.

The rest of this chapter details the specific research model and operationalization for the microcomputer software industry. Modifications to the general research model (Figure 2.2) are required. Some of the components in the conceptual model contain higher level constructs which must be dimensionalized. These higher order constructs are product-market characteristics, magnitude of investment and competitive positioning. These constructs are dimensionalized into specific components relevant to the microcomputer software industry. The specific constructs and measures included in the research model were chosen for two reasons: theory and data availability.

> **Product-market Characteristics:** Growth Rate, Concentration Ratio, Potential Market Size, and Number of Competitors.
>
> **Competitive Positioning:** 1) Price (relative list price, relative minimum price charged--mail orders, and discounted price) 2) Quality (number of features, editor's choice) 3) User Friendliness (manuals, help, service) 4) Compatibility (hardware support, service support, and product compatibility) and 5) Copy Protection.
>
> **Magnitude of Investment:** Advertising and Distribution.

These changes result in the research model shown in Figure 4.4. Each path represents a testable hypothesis. These are summarized in the

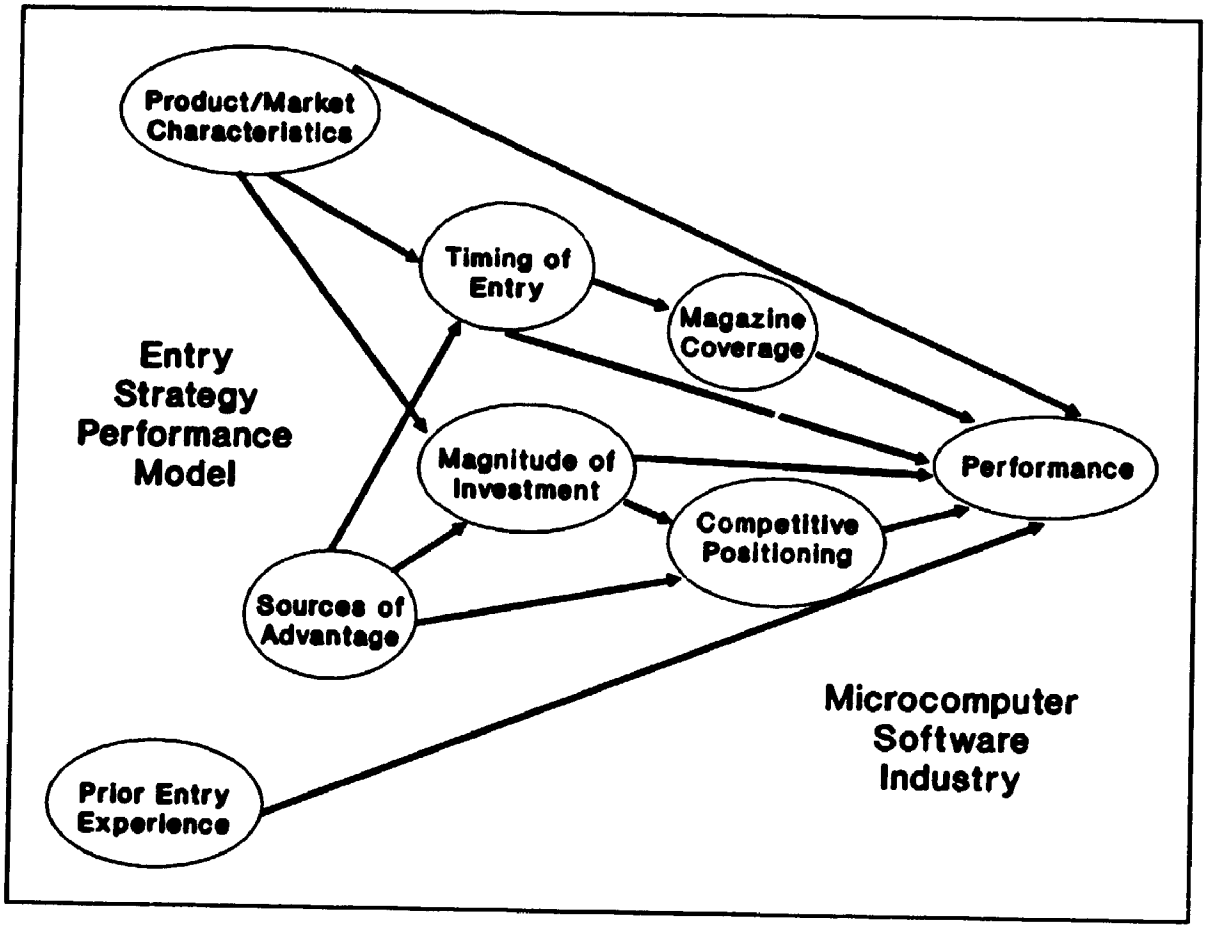

Figure 4.3 Entry Strategy Performance Model in the Microcomputer Software Industry

next section. The measures for each of the constructs are discussed in the rest of the chapter.

Timing of Entry:

T1: The earlier the entry, the better the performance (Proposition 1 from the literature review). A negative path is, therefore, expected.

T2: The earlier the entry, the greater the magazine coverage. This is because adopters are anxious to receive information about new products and there are few products with which to compete for space. A negative path is, therefore, expected between these two constructs.

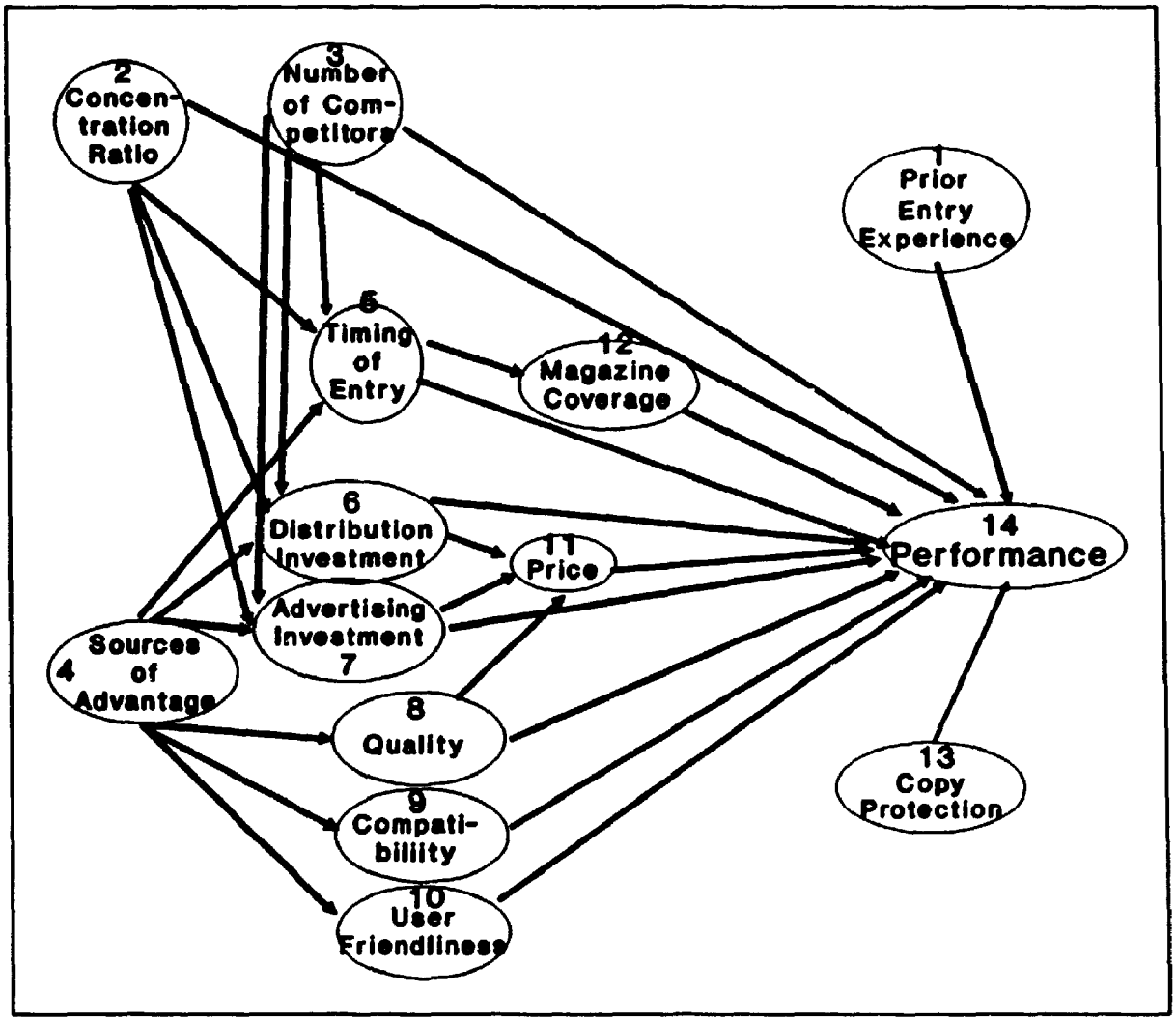

Figure 4.4 The Entry Strategy Performance Research Model for the Microcomputer Software Industry

Magazine Coverage:

MC1: The more magazine coverage, the better the performance. A positive path coefficient is expected.

Magnitude of Investment:

AI1: The larger the advertising investment, the better the performance (Proposition 2 from the literature review). A positive path is expected.

DI1: The larger the distribution investment, the better the performance (Proposition 2 from the literature review). A positive path is expected.

DI2/AI2: A firm which invests more in distribution and advertising is likely to have a higher priced product. There should be a positive path between these constructs.

Competitive Positioning:

In general, the higher the customer value delivered from the product, the better the resulting performance should be. But competitive positioning can be measured on various dimensions. The better the rating on a desired dimension, the better should be the performance of the product. For the microcomputer software product market the following paths are included in the model. It is hypothesized that the path coefficients for each will be positive.

Q1: The higher the relative quality of the product at entry, the better the performance (Proposition 3).

Q2: Higher quality products have higher prices.

Q3: The greater the compatibility of the software product at entry, the better the performance.

Q4: The more user friendly the software, the better the performance.

Q5: A product that enters the market without copy protection has a competitive advantage. The higher the relative advantage at entry, the better the performance.

P1: Higher prices reflect higher quality and should result in better performance (Proposition 4). Consumers cannot evaluate a product by simply looking at the packaging on the shelf. They need to look for external clues such as price and other people's experiences with the product. It is only after the product is purchased and is being used that the consumer can assess the quality and value of the product.

Sources of Advantage:

As the literature review notes, a firm's skills and resources or sources of advantages help to determine its competitive positioning. In the entry strategy performance model it has been hypothesized that these advantages would indirectly affect performance through both quality positioning and other constructs. The hypotheses are listed below:

SA1a, SA1b, SA1c: The more skills and resources a firm has, the better should be its positioning on important dimensions. These hypotheses are represented by a positive path between sources of advantage and quality, sources of advantage and compatibility, and sources of advantage and user friendliness.

SA2a/SA2b: The more skills and resources a firm has, the greater is its ability to invest (and hence its likelihood to invest) in areas to make the product successful. Therefore, the greater a firm's sources of advantages at the time of entry, the greater the investment expected in both distribution and advertising.

Small firms can be flexible and innovative. Large firms tend to be risk averse. They may wait to be sure a market will develop and then jump in and participate in a big way as IBM did in the microcomputer industry.

SA3: The greater the skills and resources of a firm, the later the likely entry. A negative coefficient is expected between sources of advantage and timing.

Prior Entry Experience:

PE1: The more prior entry experience the entrant's firm has at entry, the better the entry performance (Propositions 5 & 6 in the literature review). A positive path coefficient is expected.

Concentration Ratio:

CR1: Proposition 7 describes a U-shaped relationship between concentration levels and performance. Depending upon the values of the

concentration ratio the path could be positive, negative, or neutral. No direction is, therefore, hypothesized for the path.

CR2/CR3/CR4: The concentration ratio could affect both the time at which a firm enters a market and the amount that it invests in a market. No directional relationship is hypothesized between the constructs. The paths are included to see if there is a relationship.

Number of Competitors:

The more competitors there are in the market, the tougher the competition.

NC1: The more competitors in the market at the time of entry, the poorer the entrant's performance.

Over time, as more competitors enter the market, more are likely to stay in the market. Therefore:

NC2: The more competitors there are in the market, the later the market entry. There should, therefore, be a negative path between these constructs.

The more competitors there are in the market, the more difficult it is for a product to be recognized. If many competitors are in the market at the time of entry, more would need to be invested to make an impact on the market. Therefore:

NC3/NC4: The more competitors there are in the market at the time of entry, the higher the amount invested in distribution and advertising. A positive path is expected.

Data/Sources for Each Construct and Its Measures

In this section each construct is operationalized. The rationale for each measure is discussed. The measures and the sources for each are described. Each construct and its measures are presented in a diagram which also shows the relationship that exists between each construct and its measures (formative or reflective). All decisions were based on the

underlying theoretical relationship between the measures and the constructs. (Please refer to the Appendix for a detailed explanation of the rules governing the choice of formative or reflective indicators.)

Performance

Having appropriate measures of performance for each software product is critical for the evaluation and testing of the entry strategy performance model. It was not possible to locate dollar or unit sales from either published information or research organizations in the microcomputer industry. The most complete data available are the unit and dollar sales for a select group of software titles sold through chain retailers such as Computerland. Storeboard, a research firm in the microcomputer industry, provided this information. They stated that Future Computing estimates that currently less than 20 per cent of the microcomputer software sales go through this channel. Although the data are precise and in the format required, they are insufficient. Only the main players in each software category are included in the report.

Several excellent measures of performance are, however, available for the major business classes of software. These are: market share of installed base by firm name, projected market share (buying intentions for next year), and citations in business and microcomputer-related publications. For the word processing category of software, three additional measures are available. The performance measures selected, shown in Figure 4.5, are discussed in detail.

One measure of performance is the market share of the installed base of programs according to the Software Magazine's annual survey of software professionals. In 1987 they had 1747 responses from a mailing of 9600 from Sentry Publishing's database of 90,000 software professionals. Microcomputer software information is collected and published for many software categories. The market shares for all the general business software categories and several specialized business applications are

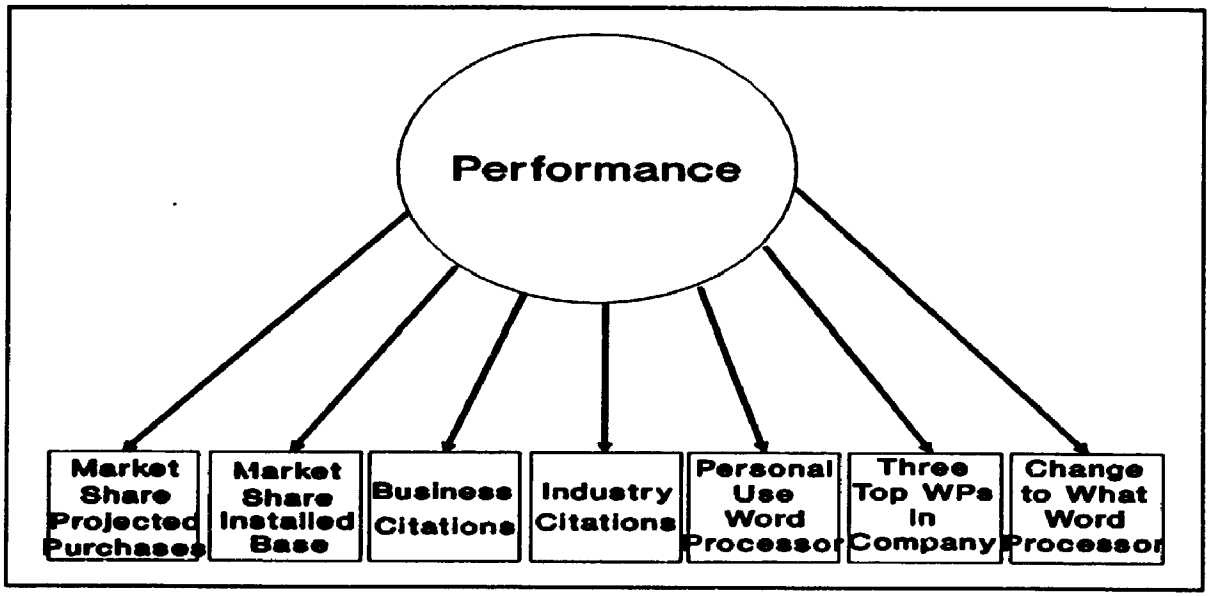

Figure 4.5 Performance Measures for Word Processing

tabulated.

The Software Market Survey from Software Magazine reports the percent of installed user base held by each manufacturer for each category of software. Respondents are asked for the names of the top two vendors for microcomputer software in eleven categories. They are also asked to list the approximate number of units of each package used in their firm. The installed base of software reflects long-term performance, not current sales. It reveals the long-term market acceptance of the software. Over time the installed base measure is changed, as some programs lose their popularity while others increase their market acceptance. This measure is, therefore, less susceptible to fads or 'flash in the pan' products than is a current best seller list.

As the microcomputer industry has expanded, so has the market for microcomputer software. The installed base has increased markedly each year. To change the market share of the installed base of products, therefore, requires a large change in current sales. As the market grows it becomes more difficult to 'break into' the market. As sales near saturation, changes in the installed base will become even more difficult. The installed base market share not only reflects long-term performance of

microcomputer software, but it also establishes an entry barrier to dissuade the adoption of other products. This is because the cost of microcomputer software is not just the dollars paid, but also the time required to learn the package. If there is a large installed base of users upon whom the new user can draw for help, the likelihood of buying an established product is greater. Truly, in this industry success breeds success.

Planned software purchases for the next year are also available from the annual Software Magazine surveys. This information is reported in terms of projected market share. This measure reflects the 'currently popular' programs in each category. Planned purchases will be included as a measure of the performance construct.

Another surrogate measure for performance is the number of citations of the software package during the twelve months of the 'performance' year. (For the word processing product market this is the number of citations from January to December of 1987.) The more popular a program, the more likely it is to be discussed when either it or a competitor's product is discussed. Tips and hints are shared. 'Standard' products are compared to the newcomers. Hence the 'standards' are cited more often than the less popular products. Citations reflect the popularity and acceptance of a program.

It is the number of citations, whether good or bad, that is the relevant measure. For years many programs have been compared with, and have been determined superior to Lotus' spreadsheet, *1-2-3*. Yet, *1-2-3* has remained the corporate standard and most popular selling spreadsheet program. As standards change, so too should the number of citations of the product. For instance, *VisiCalc* was once the standard in the spreadsheet market. It is rarely cited or discussed today.

Software packages are discussed and reviewed in many publications--similar to book reviews in many disciplines. Two sources are used for the citation measures: the ABI/Inform database and the Microcomputer Index.

The ABI/Inform database is a collection of 800 business publications. It is used because the sample for the study comprises business or corporate software. The Microcomputer Index includes *80* microcomputer-related publications. These magazines are read by 'sophisticated' users and by members of MIS departments. Both of these types of readers are generally directly or indirectly (influencers) involved in the microcomputer purchase decisions of many businesses. Use of both indexes will, therefore, cover the publications read by most purchasers and influencers in businesses[5].

For the word processing category of software three additional performance measures are available. These are the responses to three questions on PC Magazine's Interactive Reader Service. Over 1200 users responded to this survey. The interactive service users may be more actively involved in microcomputers and communications than other PC Magazine readers or computer users. It is highly likely that these respondents are the purchasers, or at the very least, influencers of software purchases in their firms.

The results were published in the February 29, 1988 PC Magazine. The three questions/measures are: 1) Which word processor do you use now? 2) What are the three most commonly used word processors in your company? and 3) If you were going to change word processors now, what program would you change to? For each word processor mentioned, the percentage of the respondents who listed it is also provided. It is this percentage, for each question, that is used as the measure for each word processor.

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[5] There is a slight overlap in magazine coverage between the two indexes. As the ABI/Inform is included as a measure of business acceptance, the more computer related publications included in both it and the Microcomputer Index will only be considered in the Microcomputer Index. (The publications common to both, and hence excluded from measure from the ABI/Inform are: Business Computer Systems, Business Software, Computer Decisions, ComputerWorld, Computing for Business, Data Communications, Datamation, InfoWorld, Personal Computing, and Wall Street Computer Review.)

Competitive Positioning

Word Processing Reviews. Since the first IBM word processor became available in November 1981, PC Magazine has published five comprehensive reviews. These were dated November 1982, September 4, 1984, August 20, 1985, January 28, 1986 and February 29, 1988. All measures discussed in this chapter are available (with minor exceptions noted in the text) in all reviews, except the 1982 review. All, except it, are used for the data collection.[6] The reviews serve two purposes. They are the primary instrument to establish the cases or programs to be included in the data set and to measure competitive positioning.

Competitive Positioning: Pricing

The constructs and variables as initially suggested were available. The specifics are described. The measures are summarized in Figure 4.6.

Price: Relative Retail Price. This measure is available for all software. The variable is coded as a ratio of the manufacturer's suggested retail price to the consumers' comparison price for that product class. The consumers' comparison price is $495 for word processors for all four comprehensive reviews. The reasons follow. The price of the recognized standard word processor, at the time of each review, is $495.[7] (The standard is not the same word processor in each review.) Using the standard product price as the price comparison is also supported empirically. The modal price during each review is $495 (with the exception of 1986 where there were two modes: $295 and $495). Hence more word

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[6] This review article consisted of a list of twenty word processors and a comparison chart of about sixty different features. Several of the competitive positioning measures not included in the comparisons were: editor's choice, copy protection, number of printers supported, and import/export functions. Also, although twenty word processors were listed, a written review was included on only seven of the word processors. Finally, seven of the word processors had not been released and were not yet available for sale.

[7] Software reviews and articles about software generally compare and contrast software packages to the standard package. It is believed that consumers also take this approach when considering software packages.

processing packages are priced at this level than at any other level. Also the $495 price is at the upper end of the pricing range. This price, therefore, serves as a signal to the consumer that this is a 'quality' product. Finally, there is a wide variance in the highest ($550 to $995) and lowest ($70 to $140) priced packages included in each review. As these potential comparison prices vary widely and not systematically, a ratio using these points would have different meanings for each year. Use of the $495 standard price will improve the reliability of this measure.

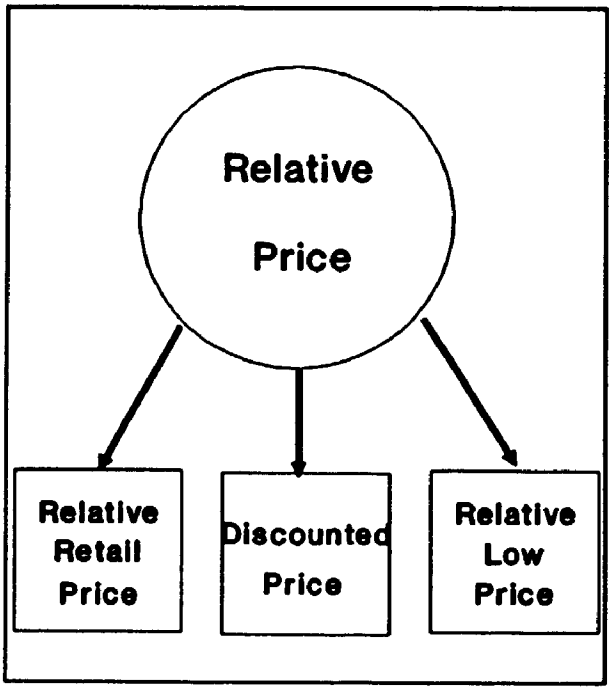

Figure 4.6 Competitive Positioning: Pricing

A value of one on this variable means the firm is charging the standard price. Higher values on this ratio mean the firm is charging more than the standard price. Values of less than one mean the firm is charging less than the standard price. Hence a higher relative price is reflected in a higher value for this variable[8].

Price: Relative Minimum Price. The lowest prices for software and hardware in the microcomputer industry are obtained through mail order operations. The variable, relative minimum price, is a ratio of the

[8] A positive correlation between this measure and performance supports the hypothesis that higher prices reflect higher quality and lead to higher performance. If there is a negative relationship this supports the hypothesis that lower prices lead to better performance.

lowest priced software (mail order or lowest other price available[9]) in this category to the firm's lowest price. If the firm's price is the lowest the value would be one, the maximum value for this variable.

The mail order price was determined by examining the mail order advertisements in the PC Magazine issue in which the review appeared and one issue before and after it. Byte and PC World of the same period were also examined. (Note: in the later years few mail order ads appeared in Byte.) If no mail order price was found, two assumptions were made: 1) that the firm did not sell via mail order (the distribution variable was coded to reflect this) and 2) that the retail price was the best estimate for the lowest price charged.

Price: Discounted Price. This is a ratio of the firm's highest (manufacturer's suggested retail price) to its lowest price (generally the mail order price) on the software package. If the firm did not sell by mail order the ratio would be one, the minimum value for this variable. The higher the value on this measure, the greater the discounted price for which the product could be purchased. The larger the discount, the better the 'customer value' for the product.

The ratios for all the pricing variables, except for the discount price, are constructed so that the higher the ratio, the lower the firm's price compared to its competitors. A positive path would confirm the hypothesis that lower relative prices lead to higher performance.

Competitive Positioning: Quality: Features and Editor's Choice

The data available in the microcomputer software industry allow two types of quality measures. The first is a measure of overall quality, the 'editor's choice'. The second type compares the features in the software packages.

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[9] When no lower price has been located, the manufacturer's suggested retail price is used.

Although this rating generally denotes the 'best value product', products designated as the 'editor's choice' still do not achieve 100% market share. Some customers are willing to pay more to gain minor benefits. Others purchase a less expensive package with fewer benefits than are present in the best value package. It is, therefore, important to include at least one other measure which can capture information about the features each program offers.

Each product review rates the software on many dimensions. The 'number of features' measure could either rate each package on the total features or on the different dimensions. Inclusion of the various dimensions provides for a richer examination of this industry. The importance of several dimensions, not just in the word processing category of software, but in all types of business software, is the basic criterion for the features constructs measured. The importance of these groups of features is based on the attention paid to each in the industry publications.

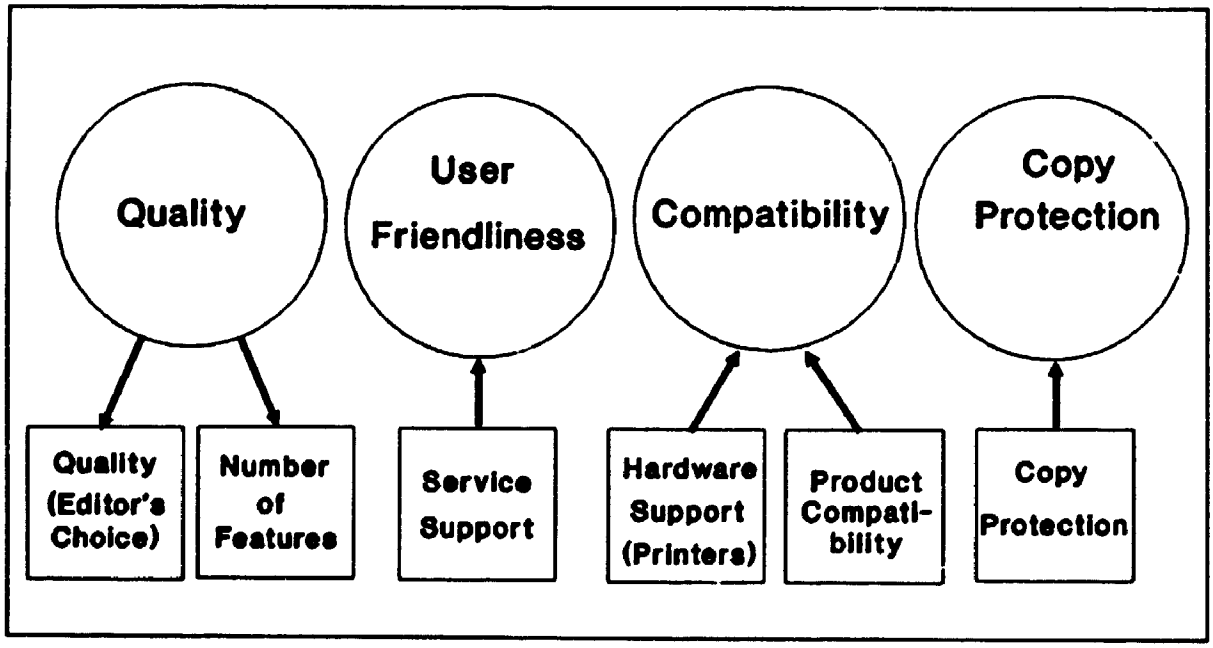

Figure 4.7 Competitive Positioning: Quality and Features

The categories of features singled out for measurement are copy protection, compatibility with both hardware and software, and user

friendliness. The rationale for the choice of each construct and the actual measures are discussed in the following sections. All other features (those not singled out as an important cluster) examined in the comprehensive reviews are included in a separate quality measure called 'number of features'. The measures for all the quality and other positioning constructs are summarized in Figure 4.7. The quality of the software is reflected by the measures chosen. The other competitive positioning constructs are all defined as formative constructs as the constructs are defined as those measures.

Quality: Editor's Choice: Coded yes or no. In this industry the product reviews generally conclude with an overall rating; that is, one or two products are generally selected as the best or the "editor's choice" in the PC Magazine product reviews. This is a surrogate in this industry for the best customer value in that software class. This measure, therefore, provides the closest real world measure to the general definition of positional advantage as customer value[10].

One comment about this measure is necessary. It is included in the model as a measure of competitive positioning. This measure does register the customer value, as perceived by the product reviewers. It may also be possible that simply receiving this designation will increase sales, because some retail stores specifically try to carry all editor's choice products as there is generally a high demand for them. Whether or not this is the case is not the issue here. This recognition of the product as superior is the underlying reason more people want to buy the product. Many people do not have the time or expertise or money required to test

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[10] In both the 1984 review and the 1985 word processing reviews PC Magazine did not select any programs as the 'Editor's Choice'. This convention began at a later date. In both of these reviews the individual package write-ups were read thoroughly. The programs which were discussed as an overall package with superlatives were then classified as Editor's Choice programs. In 1984 *WordPerfect* ("All in all, *WordPerfect* is absolutely stunning.") and *XyWrite II-plus* ("*XyWrite II-plus* is one of those rare programs that is so good that you almost have to go out and buy somebody else's program along with *XyWrite* in order to fully appreciate what you have.") were designated as Editor's Choice packages. In 1985, only *WordPerfect* was chosen as an Editor's Choice.

out these complex products. They, therefore, rely on the expert judgement of someone in the industry whom they trust. It is, therefore, an appropriate measure for this model.

Quality: Relative Number of Features. All features discussed in each review article were included in the potential number of features count.[11] For each review the presence or absence of a list of features is noted for each software package. The features of every product in the review were totaled. As this is a measure of competitive positioning, the entry product and its features are compared with the product with the most features in the review. This provides a measure of the relative number of features the program contains.

This relative measure is a ratio of the product's features divided by the 'best' product's features. The ratio is used for three reasons: 1) to provide a comparison rating, 2) to control for different expectations and features reviewed across time and product categories, and 3) to control for a different number of packages in each review.

Copy Protection. Copy protection is unique to the microcomputer software industry. It was a hot issue several years ago. By 1990 it does not appear to be critical as most firms have decided to drop copy protection. When many products were copy protected, sales were probably affected by the existence of copy protection on a product. Products with copy protection were berated in the press, cursed by users, and not purchased by others. For example, the U.S. Government would not purchase Lotus *1-2-3* unless they were provided with unprotected copies. The government, and likely many businesses, felt they could not afford the downtime that would occur if a disk was damaged and they could not immediately reinstall the program. A whole product-market niche of copy breakers grew up to meet the need of users to have reusable backup disks if the original was damaged.

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[11] Except for the features associated with copy protection, hardware and software compatibility, and user friendliness. These are separate constructs.

Conner (1986) makes a persuasive argument that the lack of copy protection could be helpful to a firm's sales because one of the largest costs of using any software is the investment in time in learning how to use the programs. If 'non-registered' users can gain access to a program they will enlarge the user base and hence the reserve of knowledge that legitimate users can tap.

This use by 'unregistered users' allows them to "test drive" the software vehicle. If the package is good this can lead to increased sales for the company. Many of these users may purchase the product to obtain legitimate copies and to get access to future upgrades and support. These experienced users also make recommendations to others to purchase the program. The dummy measure for copy protection has a different interpretation depending upon the presence or absence of copy protection. If copy protection is present this is a surrogate of a noxious attribute. If it is absent the dummy variable is a surrogate for the availability of the program for trial use by potential purchasers.

A program has a relative advantage in the microcomputer software industry, if it does not have copy protection. Over time, as more and more programs dropped copy protection, the relative advantages that a firm established by not having copy protection diminished. Therefore, it is necessary to capture the magnitude of the advantage, not simply if copy protection was included on the program. There are two ways to include this timing effect: 1) include a path from timing to copy protection or 2) establish a measure that takes into account the relative differences.

The following rules were followed to establish a value for the copy protection variable. First determine the proportion of competitors that have copy protection at a particular point in time (i.e., at the review). Second, if a product does not have copy protection, assign that case the proportion determined in step 1. If a firm does have copy protection assign the value zero. This coding scheme measures the size of the relative advantage of not having copy protection. The fewer the

competitors to incorporate this desirable feature, the greater the competitive advantage the firm secures.

In the September 4, 1984 word processing review, nineteen word processors were compared and contrasted. Information was not provided for copy protection. The abhorrence of copy protection by users was clear in many articles and editorials (Strothman 1982, Kelly 1983, Stark 1985, Bunnell 1985 and DiNucci 1985). In the very early years of DOS, copy protection was the norm. It was, therefore, assumed for this 1984 review that all the programs had copy protection unless there was information to the contrary in the review write-up or other articles. (Five packages were coded as not having copy protection.)

Compatibility: Hardware Support. The one piece of hardware that is necessary for all users and must be supported in some fashion by all types of business software is the printer. Users are not likely to purchase software that is not supported by their printers. If users have access to several it is convenient to print on each. The more printers supported, the greater number of potential users. Hardware compatibility is thus operationalized as the number of printers supported. Once again, for a competitive positioning measure, it is the relative competitive positioning that is important. This hardware compatibility measure is the ratio of the number of printers supported by the entry package to the product which supports the largest number of printers during that particular review.

Compatibility: Products. A program is useful if it can be used to supplement/enhance the results from other programs. For example, it is useful for a word processor to be able to import and export information. Retyping numerical information from a spreadsheet for use in a word processor is tedious and prone to errors. The ability to import information from spreadsheets is an asset. Coauthoring a paper is simplest if both authors use the same word processor. If this is not possible the ability to pull in (import) the text written with another word

processor and to write it out in the other program's format (export) is handy. The program with the greatest possibility of interfacing with others on the market is preferable as it reduces the time wasted 1) learning and using other software packages and 2) retyping information already in a computer.

Each of the major word processing reviews assesses compatibility with other software packages. Over time, expectations for compatibility have increased. For example in 1986, word processing compatibility existed with other word processors, Wang and WordStar, and ASCII files. In 1988, it was with other word processing packages, with desktop publishers, and with *Lotus* spreadsheets. A ratio of the number of possible program exchanges to the best competitor's number (for the entry review) makes up the software compatibility measure.

User Friendliness. User friendliness measures the amount of 'help' provided by the software firm. Depending upon the review it may include such items as tutorials, reference material, toll-free help lines, etc. In each review all 'user friendly' features for each program are summed. This total is compared with the 'best' competitor's rating for a relative measure of user friendliness.

Timing of Entry

After collecting the positioning information, the next most important variable to collect was the date of entry. This was the date the product was released (not announced). Unfortunately, there was no one comprehensive source for the date of entry. The date a product entered the market was established from the following sources:

1. Historical article about word processing from a 1988 PC Magazine.
2. Business Mini/Micro Software Directory, 1986.
3. Business Mini/Micro Software Directory, 1984.
4. Software Catalogue.
5. Online search of the MicroComputer Database
6. Manual search of the MicroComputer Database: review of abstracts
7. Various related articles

For the analysis the raw date of entry is not used. It is converted into two measures. The first is Number of Months Since the First Entrant in the product market in the DOS environment. The first software package available for the IBM PC was a word processing program named *EasyWriter*. It was available when the first IBM PCs became available. It was written by Information Unlimited Software but was sold by IBM. IBM announced the PC in August 1981. The IBM PC was not delivered in any quantity until late October or early November 1981 (Edlin & Bunnell 1982). November 1981 is, therefore, used as the date of the first entrant in the word processing market. As *EasyWriter* is the first word processor, it is coded with a zero for the number of months since the first entrant. All other word processing entrants are dated from November 1981.

A second measure of the timing of entry is also included in this study: Number of Previous Entrants. This measure is based on a cumulative number of product entrants to the market. The number of previous market entrants scale was developed from many sources: the advertisements in PC Magazine, PC World, and Byte, Data Sources, review articles in these magazines, product announcement and product lists. This scale was derived by listing every word processor discussed anywhere. The first date that the product was mentioned anywhere is also recorded. The result was a monthly list of new product entrants from November 1981 to the end of 1987. For each case the cumulative number of entrants, prior to this case's entry, provides the second timing measure. The next few paragraphs delineate each step in the number of previous entrants scale development.

First, a listing of all the word processor advertisements in the three magazines was examined. The date of the first advertisement for each product was provisionally listed for this scale. The software reviews were examined next. If the review for a product was earlier than the advertised date, the date of entry was changed to it. This same action was done with the product announcements. After this, several early comprehensive software lists were used to locate the earliest market

entrants. If the products had either not been included in the data set, or had a later date, they were added with the date of the comprehensive listings. The comprehensive sources for the early years are Data Sources and comprehensive product lists from PC World and PC Magazine.

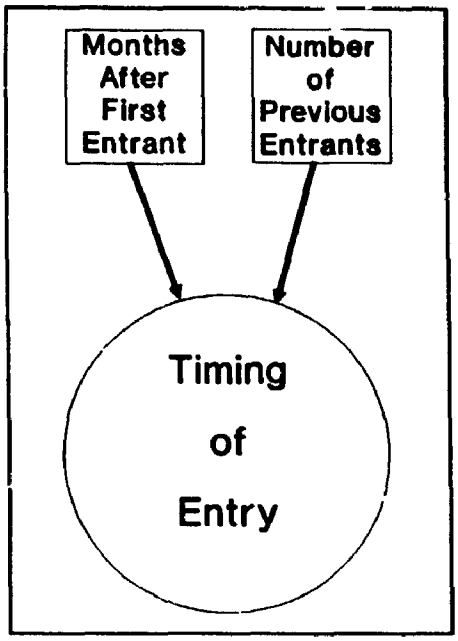

Figure 4.8 Timing of Entry

Data Sources is a publication by Ziff-Davis which provides information on the products and vendors in the 'information processing' industry. The first year of publication was 1981. As with any publication of this type, the longer it is around the more comprehensive are the data it reports. This is because they have a database upon which to build and vendors become more aware of the publication. During the first couple of years after the IBM PC and DOS became available, Data Sources listed very few vendors for DOS products. For those years two industry publications were used to help compile the complete list of new entrants. After entrants were added from Data Sources, the PC World and PC Magazine lists were inspected.

In September 1982, PC Magazine published a "PC Product Guide". It was an ambitious project listing all the programs available for the IBM PC to show that it was well supported. They listed a total of 584 programs in many program categories. Similarly in 1983 and 1984, PC World published a similar software review listing available programs. With these comprehensive lists for the early years and Data Sources for the more current years, the resulting listing of new program entries is as comprehensive as it is reasonably possible to compile.

Once all the products and their earliest date of mention had been listed, the measure, number of previous entrants, was calculated for each

month.[12] This figure is the cumulative number of entrants prior to the month in question. For each case the number of previous entrants on the scale for the month the product entered the market is the figure used.

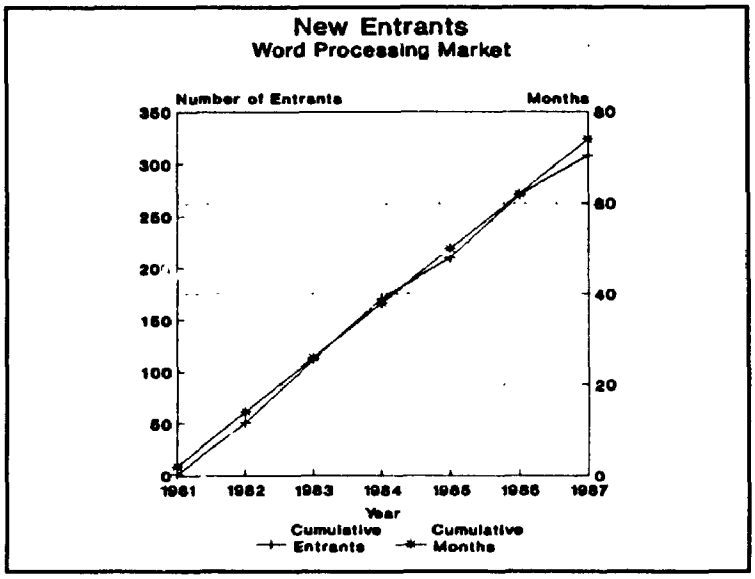

Figure 4.9 Comparison of the Timing Measurement Scales

Figure 4.9 shows the similarity of these two measures of timing in the word processing market. Together these two measures form the timing construct.

Sources of Advantage

The skill and resources of the firm, just prior to entry, are those which enabled the firm to develop the entry strategy which it pursued. Therefore, the date for the sources of advantage measures is just before entry. Once the date of entry is established, measures for the sources of advantage are collected.

Many of the traditional skills and resources do not apply in the microcomputer software industry (see Table 3.1). Two, however, are critical to success in this industry. First, human capital is necessary to recognize market needs and to develop user-friendly programs to meet those needs. Second, firms need access to capital to produce and distribute the product. In this industry capital requirements are not

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[12] As the lists in PC Magazine and PC World and in Data Sources were published only once in the Fall of the year the entrants added from those sources were allocated equally over the previous twelve month period. In this manner a unique number of new product entrants was calculated for each month.

very high. The only costs to produce the physical product, after it has been programmed, are for diskettes (about 30 cents each) and the printing of a manual. Distribution and advertising costs are higher, but still much lower in this industry than in many others. All the capital requirements can be eliminated if the product is distributed as shareware.[13] However, few business software programs are shareware. The more capital the firm has access to, the more it could invest in production, advertising or distribution.

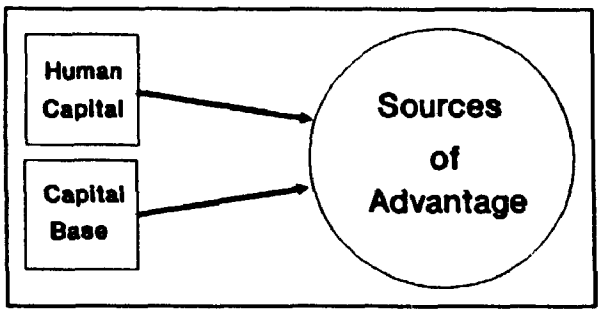

Figure 4.10 Sources of Advantage

Human Capital. The microcomputer industry relies heavily on manpower. Programs are almost solely the product of human beings. A direct measurement of the value of the human capital in a firm is well beyond what could feasibly be done in this dissertation. A surrogate is employed: size in terms of number of employees. This measure reflects the skills and resources held by the employees. It provides a rough measure of the firm's human capital.

Capital Base. Capital is needed to hire programmers, develop package materials, provide service and any promotions. In this industry, production costs are minimal (some floppie disks and some binders). Large production facilities are unnecessary. Money would allow the firms to finance the production, as needed, advertising, distribution, hiring, etc. As all costs are current expenses, the total of the prior year's sales is a good surrogate for the capital available in this industry. It provides a rough estimate of the firm's cash flow. In this business most

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[13] Shareware is software that is not sold in commercial packages but is passed from user to user either personally or through bulletin boards. The product is self-contained. If the user likes and uses the product, he/she is asked to forward some amount of money to the developer of the product. By its nature the complexity of the program and the cost of the program are generally kept low.

production costs are quite low so that most of the sales dollars should contribute positively to the firm's cash flow and its ability to finance the product.

The Data for the Sources of Advantage Construct. Unfortunately, although there are some excellent sources of this type of information, they are incomplete[14]. That is, either the sources of information did not continue to publish, software firms are not listed, or incomplete data have been reported. This is not surprising. Many of the entrants in the software industry, especially in the early years, were very small firms. There is often a delay between a product entry and the recognition of that firm as a competitor in the market. Hence, information is not often available for the year prior to entry or even the year of entry into the market. Also, many firms, even when they are listed, are reluctant to provide information (especially sales data).

For the word processing category the data were available for all the products except for dollar sales for the year prior to entry. This measure could not be located for six products. A regression, including only the cases near the missing range of values, was performed between the

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[14] The 1984 Microcomputer Market Place reports 1982 sales data. A prior version, the 1983 Microcomputer Market Place printed 1981 data. This publication is an excellent source. For each software company it lists the address, number of employees, prior year's annual sales, and some other general information. The introduction to the book indicates that it was to be an annual publication. Unfortunately, a letter to the publisher was returned as 'Addressee Unknown'. Other sources were, therefore, sought to provide the information for the later market entrants.

Data Sources lists the number of employees (and sometimes, sales) for software firms. Data Sources has been published throughout the '80s and is an excellent source for this information. It is, however, incomplete. Information is not available for all the companies.

Soft-letter produces an annual list of the top 100 firms in the microcomputer industry including their sales, and in recent years, employment data. Unfortunately, the first Soft-letter 100 report was in 1984. Data are, therefore, missing for the first few years after the IBM PC was introduced. Soft-letter also excludes many smaller firms for which data were needed.

As a last, expensive resort, when all other sources had been exhausted, searches were made on-line via CompuServe. The Standard and Poor's database provided employment information for one firm.

number of employees and sales data for the remaining cases. By using this regression equation the values for the missing cases were imputed.

Prior Entry Experience

If a firm sells products other than the software product of interest, it will have access to skills and resources not included in the sources of advantage construct. The more related a company's other products, the greater its entry skills for the software product. For example, IBM sells microcomputer hardware, mainframe computer hardware and many other related products. IBM has skills not present in start-up software firms and access to vast resources that most software firms also do not have. The sources of advantage construct includes human and capital resources. These measures, however, do not include a firm's skill in bringing new products to market through prior entry experience.

Prior entry experience can be general or related. General entry experience comes from being in business, any business, and making product entries over the years. Related entry experience is a measure of how close the past entry experiences fit with the current entry needs. These two measures of prior entry experience form the construct included in the entry strategy performance model (See Figure 4.11). In a similar vein, Mitchell (1989) used "industry experience" and "experience with similar products" as predictors for entry and timing of entry. He found that, although not significant, both were positively related to the probability of entry into a market.

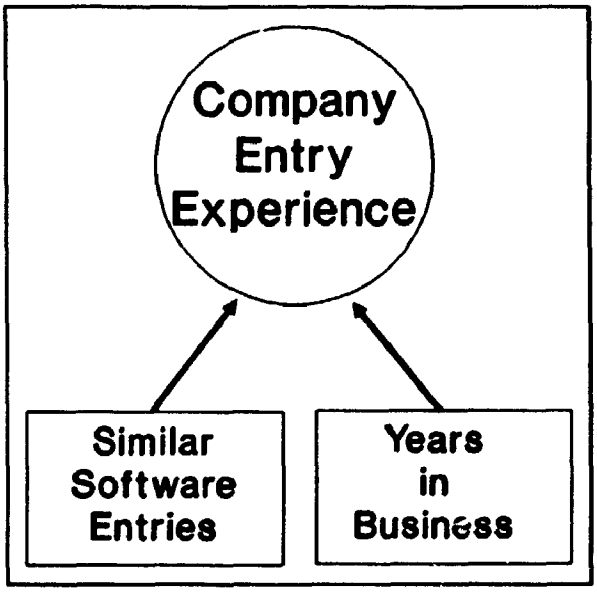

Figure 4.11 Prior Entry Experience

It is not possible to determine the number of previous product entries each company has made. It is possible to determine how long a company has been in business. The date of establishment of the firms was collected for each firm in the database. (The primary source of this information is Data Sources.) The measure of general entry experience is, therefore, the year of entry minus the year of establishment.

The related entry experience measure is coded on the following ten point scale:

10 = Same Micro Product Class, Same Operating System (e.g. Easy by MicroPro)
9 = Same Micro Product Class, Different Operating System (e.g. WordStar)
8 = Micro Software, Different Class (e.g. DataStar by MicroPro)
7 = Micro Software, Different Product Class & Different OS
6 = Mini or Mainframe Software, Same Product Class (e.g. WordPerfect)
5 = Mini or Mainframe Software, Different Product Class
4 = Other computer, not microcomputer, manufacturer--Mini or Mainframe
3 = Microcomputer Hardware or Peripherals Manufacturer
2 = Large Unrelated Business
1 = Small Unrelated Business
0 = New Business, No Prior Sales

This measure of related entry experience was gathered from many sources. For most of the major software players, feature articles have appeared which detail the history of the product or company. Also, in the early years because most new products received some press coverage information is available for many of them. For other programs no information is available in this manner. Where this has been the case, two other sources of information have been used: advertisements and Data Sources.

In the early years, almost all advertisements for microcomputer software products showed which operating systems the package would run on. Many would stress that the program was "now available for the IBM PC". Programs available for multiple operating systems whose ads did not indicate which was the original operating system were assumed to have been first sold for a non-DOS environment. As many of the first products marketed for the DOS operating system were translated from other operating systems, this is a reasonable assumption. If the information had not yet

been located, the earliest Data Sources issue which listed the program of interest was reviewed. The operating systems upon which the software operates are listed. Often, it was clear that DOS was not the first operating system for which the product was developed. Sufficient information was located for all the word processors to assign a value for this experience measure.

Magnitude of Investment

This construct was one of the more difficult constructs to measure because it involves internal company expenditures. The amount of the expenditures varies from company to company based on both the results expected and the firm's efficiency. According to its definition in Table 3.1 the following items could all be considered measurements of the magnitude of investment a firm makes at the time of entry: research and development (R&D) expenditures, advertising expenditures, promotional expenses, sales force & other distribution expenses. Measurement of some of these dimensions would not be possible without contacting the firms and securing their cooperation (R&D expenditures, promotional expenditures, and sales force expenditures). Even with a survey it would be difficult to get measures on these variables because 1) it is unlikely that the accounting records are well enough developed to allow for attribution of the expenditures to the proper products, 2) firms are leery about providing such proprietary information, and 3) many of the firms are no longer in business.

However, it is possible to measure at least two important investment areas by utilizing data that are publicly available. The two areas for which data can be collected are distribution and advertising. The measurement of these constructs is described below and diagrammed in Figures 4.12 and 4.13.

Magnitude of Investment: Advertising

The magnitude of advertising investment at the time of entry is approximated by examining software advertisements. The advertisements measured are those found in the top three personal computer-related magazines (by circulation). In the Computer Industry Almanac 155 industry-related publications are listed. The publisher's name, circulation, and description are listed. C Systems, Ltd. provided information on software advertising. Criteria for inclusion as a source were 1) the rank of software advertising pages, 2) the circulation of the magazines, 3) relevance to the IBM PC or DOS personal computer market, and 4) availability to a wide audience (eliminating publications designed and available mainly for the retailers)[15]. The software advertising in the following three publications provides the raw data for the surrogate measure for the magnitude of advertising investment: PC Magazine, PC World, and Byte.

The size of each ad and the product category being advertised were recorded for products in five software categories for the three magazines for the years 1981 through 1988. The information for each product was then extracted from this data base for the six-month entry period for each magazine: the number of ads placed for the software, the volume (summation of the various size ads) for the software, the number of ads for competitive software, and the volume of ads for the competitive software. (The six-month entry period was chosen as the period for the measurement of the advertising because 1) it has been established as the entry period and 2) firms have direct control over the timing and placement of advertisements.)

For each product there are six measures: a volume and number of ads ratio measure for each of the three magazines. Each of these measures consists of a ratio of the product's ads to competitors' ads in that product category during the six-month entry period. Separate measures for

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[15] Table 4.1 lists the detailed information used to make this decision, for the top twenty microcomputer software-related publications.

Table 4.1 Top 20 Publications: Software Advertising Pages

Publication	Pages	Revenue	Circulation	Frequency	Focus/Target Market
ComputerWorld	1181	$14.0	125,000	Weekly	computer professionals
PC Week	1056	$ 9.2		Weekly	newspaper: IBM aid
PC Magazine	1020	$ 9.8	375,000	BiWeekly	independent guide for IBM aid
PC World	756	$ 7.3	290,548	Monthly	information for IBM users
Byte	678	$ 6.8	400,133	Monthly	knowledgeable microcomputer user
Computer Reseller News	617	$ 1.3		Weekly	microcomputer info. for resellers
PC Tech Journal	574	$ 3.4	100,000	Monthly	system design, intg and app. devel.
InfoWorld	512	$ 4.5	160,000	Weekly	microcomputer industry
Computer+Software News	450	$ 1.4		Weekly	current reseller information
Datamation	450	$ 4.2		Semi-Monthly	executives, managers or EDP professionals
MacWorld	420	$ 3.1	156,176	Monthly	new products & advice--Macintosh
Digital Review	386	$ 1.8	80,000	BiWeekly	exclusively for DEC computers
Business Software Rev.	357	$ 2.0	75,000	Monthly	information for end users, DP/MIS
Information Week	316	$ 2.8		Weekly	info. management, news magazine
Rainbow	316	$ 1.0	69,546	Monthly	Tandy color computer users
Personal Computing	303	$ 3.0	475,000	Monthly	personal user, not technical
A+	297	$ 2.3	175,000	Monthly	new products for Apples
Lotus	297	$ 2.9	366,000	Monthly	*1-2-3* and *Symphony* information
Software News	271	$ 1.5			
MacUser	263	$ 1.3	100,000	Monthly	education for Macintosh users

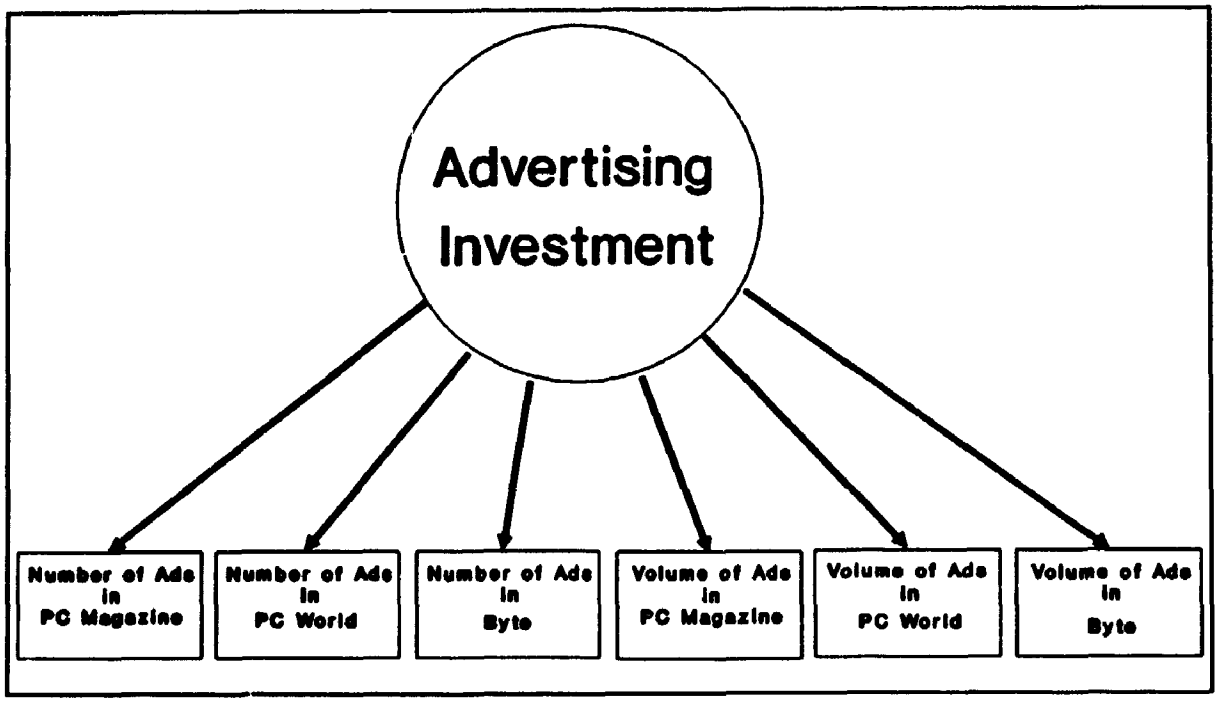

Figure 4.12 Magnitude of Investment: Advertising

each magazine control for different advertising rates, different reader profiles, etc. Separate measures for the number and the sizes of ads allow partial examination of the effect of larger size ads, if any. These six measures of advertising reflect the advertising investment made for each software product during the entry period (Figure 4.12)

Magnitude of Investment: Distribution

In the microcomputer software industry, sales are made through the following channels: direct sales, retail stores, and distributors. Direct sales are not used by many of the companies. For most, non-shareware firms, direct sales only arise when the manufacturer sells updates to current customers or when a new product is offered to old customers. Very few firms hire their own direct sales force as the low price of software warrants personal selling expenditures only in very high volume circumstances.

Most sales are either retail or mail order sales. Of the three channels for selling software, the largest investment would be required in

retailing. In that sector the firm must sell the products to the reseller, ship the products to the reseller (either a distributor or the final retailer), and provide support to the reseller. Sales to a mail order distributor would require a much smaller investment on the part of the firm. Infrequent large volume shipments to the distributor lower the per unit transaction costs. Support for mail order sales would be minimal as the level of support the distributor provides to the end user is minimal.

It was, therefore, originally proposed that distribution investment be measured by the proportion of a firm's sales which are made in retail stores. The assumption was that the higher the sales through the expensive retail channel, the greater the firm's investment in distribution. Unfortunately, detailed data for this construct are not readily available. There is no source which describes how each package is distributed. Proportions of sales through the various channels are unavailable. It is, however, possible to determine which channels are used for sales.

Software advertisements generally list how and where the software product may be purchased.[16] The availability of the software, according to the advertisements, was recorded for products. Software packages are distributed 1) exclusively by the company, 2) through mail order companies (the mail order company ads list the prices of software packages), 3) in retail stores (software or hardware or bookstore), and 4) as 'legal' test drives from other users (shareware).

The use or nonuse of a particular channel can, therefore, be coded with a zero or a one. A one indicates a requirement for some form of investment by the firm. Zero means no expenditures required of the firm. The measures are as follows:

Direct Sales: Coded 'One' If Purchases Can Be Made Directly From the Firm

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[16] Where incomplete data were available for a particular channel for the product it was assumed that no investment had been made for that channel.

Retail Stores: Coded 'One' If Purchases Can Be Made In Any Retail Stores
Mail order Sales: Coded 'One' If Purchases Can Be Made By Mail Order
Shareware: Coded 'Zero' If A Product is Shareware and a 'One' otherwise

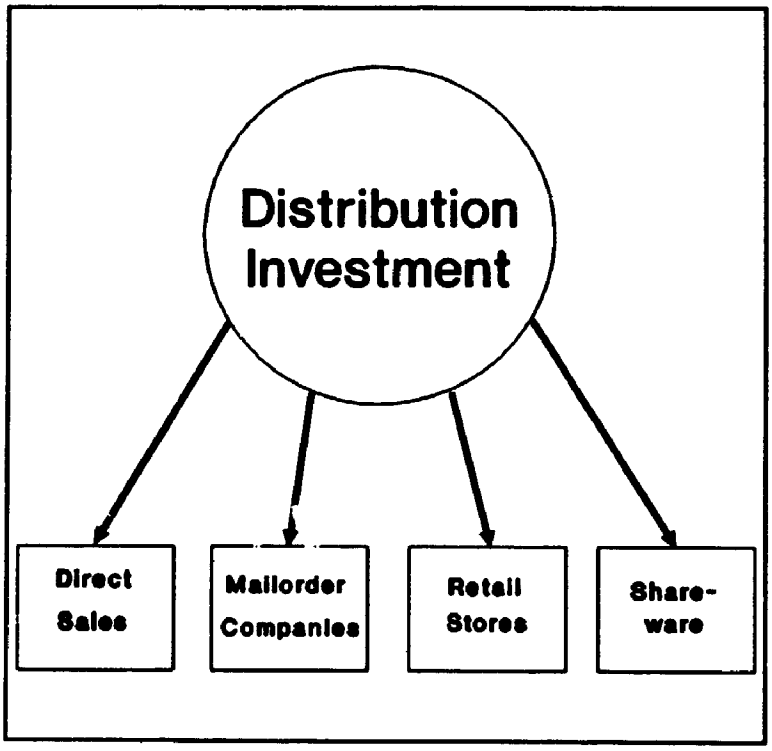

Figure 4.13 Magnitude of Investment: Distribution

For the first three channels measured the firm must make some type of investment to generate sales. At a minimum contacts are required with these channels to coordinate delivery and payment. At a maximum firms may employ full-time sales representatives to sell the products. On the other hand, shareware requires no marketing investment at all by the firm. On the diskette with the product is a statement similar to the following: "Please send $X.xx to the following address to become a registered user of this product." The firm does no distribution of the product. It is, instead, done by "word of disk": consumers copy the program and give copies to their friends and associates who, in turn, do the same. Popular shareware products often appear on local bulletin boards or are collected by local software clubs for redistribution--at no cost at all to the original manufacturer. Consumers who use the program, and are honest, send money to the manufacturer. With some shareware this entitles one to a greater level of service or a more advanced copy of the program. For others there is no difference in the product whether one pays for it or not.

Product Market Characteristics: Number of Active Competitors

The number of active competitors at entry is reflected by two measures. The first measure only includes competitors who are actively advertising their products during the new entrant's entry period. It is the number of different competitors in magazine advertisements (Byte, PC Magazine, and PC World) in that product category during the six months after entry.

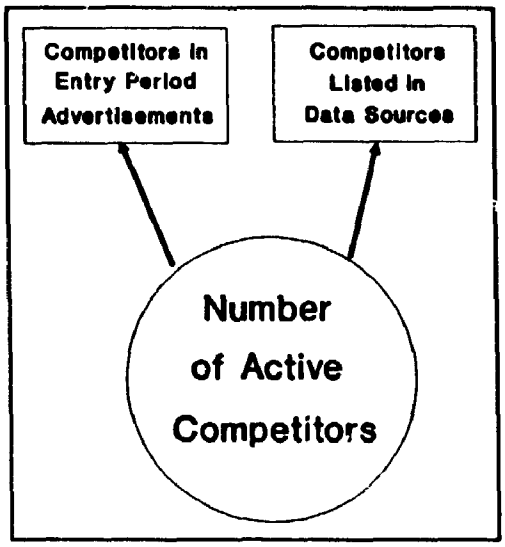

Figure 4.14 Number of Active Competitors

The second measure is the number of companies listed as producers of that category of software in Data Sources for the year of entry. The annual incremental increase (or decrease) in competitors is apportioned over the prior year. This assumes competitors entered at regular intervals across time and not simply once a year. The value used for this second measure was, therefore, the estimated number of active competitors during the month of entry.

Product-market Characteristics: Potential Market Size

This construct was dropped from the analysis. There is no single source for its measure. Attempts were made to estimate it from a variety of sources. Sufficient data could not be located.

Product-market Characteristics: Concentration Ratio

Concentration is commonly measured as the sum of the market shares of the four largest market shares in the industry. This definition is used here. The Software Magazine's annual survey results include an estimate of the market shares in both the installed base of software and the market shares for the projected vendors for the next year. Both

reflect the true concentration level in the industry. The year for which the measure is taken is the year of entry.

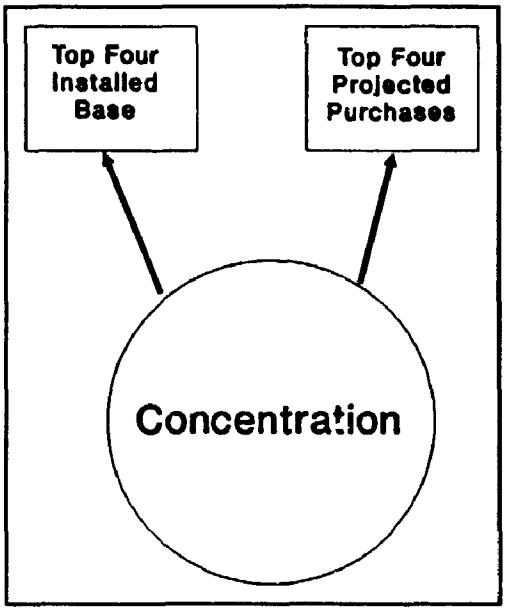

Figure 4.15 Concentration

Product-market Characteristics: Growth Rate

Unfortunately, there is no single source for these data. There also have been no publications which have reported this information for an extended period of time. The research firm, DataQuest, provided unit sales for 1987 and 1988 and the Software Publisher's Association provided dollar sales for the same years. Information for earlier years is scanty and has been published 'randomly'. The Software Publisher's Association did not collect data prior to 1987. DataQuest has not published the information and only provides it to their clients. No other sources could be located for the data. Because the information located was not even complete enough to interpolate missing data, this construct was dropped from the analysis.

Magazine Coverage

In the microcomputer software industry, new product announcements are often printed. Often these announcements are followed by software reviews of either that product alone, or a comparison between it and similar products on the market. New versions of products are compared and contrasted with similar products. This press coverage occasionally appears in newspapers or general interest magazines but generally is displayed in the many magazines published about the microcomputer industry. Most of the publications in the industry devote the majority of

their pages to keeping the consumer up to date on the current software and hardware available and any trends in the industry.

Because of the nature of software, it is not possible for consumers to 'test drive' the numerous software programs on the market. Many consumers, therefore, rely on either 1) the testing and information provided by the professional reviewers hired by the magazines or 2) their knowledgeable associates who read these publications. Software firms aid the magazine publishers by supplying new product announcements and copies of the programs for review articles. The programs and information are often provided to the press long before they are available to the general public. This allows the publications to provide up-to-the-minute information, while the software publishers try to get as much free publicity as possible. Given the activities of the manufacturers (making the products readily available to reviewers), the publications (publishing reviews and announcements) and consumers (who avidly consume this information), getting a product reviewed at entry may help sales. This surmise is supported by the following quotation about high technology markets such as microcomputers and microcomputer software:

> Winning a quick endorsement from the market is critical to success. Once a product wins rave reviews, it picks up momentum in the marketplace. Success builds on itself. The product develops a positive image, and customers flock to it. On the other hand once the market sticks a product with a "loser" label, the product has a tough time recovering. (McKenna 1985, p. 82)

The importance of press coverage in this industry dictates its inclusion in the entry strategy performance model.

Software Reviews and Citations. Five manifest variables comprise the construct, Magazine Coverage. The indicators are four review classifications and the number of other magazine citations. The Microcomputer Index includes a rating for each software review in its database. Each software review article is coded as either very favorable, favorable, mixed, or unfavorable toward the reviewed product. This information is coded in six-month intervals: six months before entry,

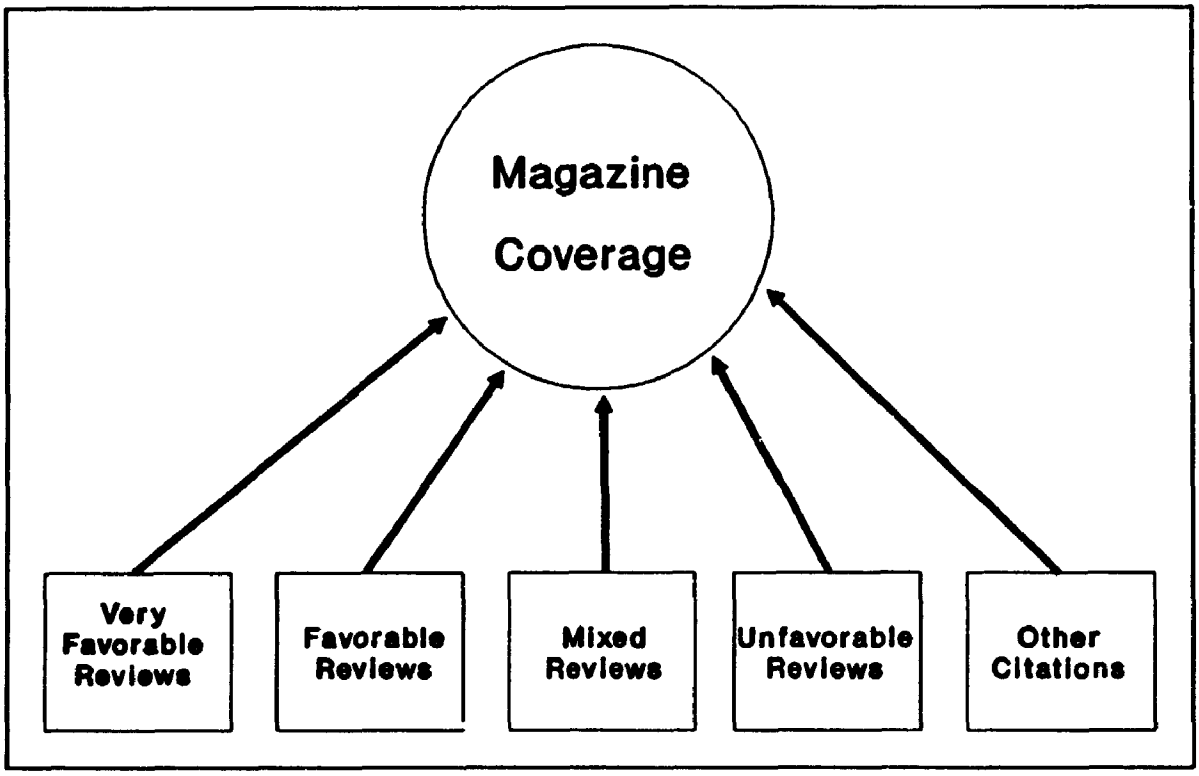

Figure 4.16 Magazine Coverage

first six months after entry, and the next six months following entry. The number of reviews in each rating category in each time period is recorded. Similarly, all other magazine citations (i.e., not rated reviews) are coded as 'other citations' and recorded for each six-month period.

The appearance, timing, and content of software reviews are not (normally) under the direct control of the firm. The appearance of the reviews is customer- and media-driven. Reviews may appear early, even before the product is officially released. This happens if the product was announced earlier and either arouses curiosity (e.g., what is IBM doing?) or is anxiously awaited (e.g., when the successful CP/M program *WordStar* was announced for DOS market). For other software products it may take a few months after entry for the product's name and qualities to be noticed. Many product reviews do not appear until the second half of

the year after entry. For these reasons an entire twelve-month period is included in the analysis as entry period magazine coverage.

It is postulated that the greater the number of very favorable software reviews, favorable software reviews and citations, the better the performance of the product. Unfavorable reviews should be associated with poorer performance while mixed reviews should have no impact on the performance. The loadings of the measures provide a test of these hypotheses.

The time at which a product entered the market affects how many reviews and citations are published for the product. In the beginning of the market there were few products; consequently, each new one generated excitement in the marketplace. The new product was announced and may have appeared in one or more reviews. As more and more similar products entered the market it became difficult to be distinguished as different. And if a program is not different from existing products, why should anyone take notice? It is, therefore, likely that the later a product enters the market the more difficult it is to get software reviews and other citations. This hypothesis is included as a path between timing of entry and magazine coverage.

Summary of Research Model

Figure 4.4 summarizes the constructs and the hypothesized relationships between them. The specific hypotheses represented by the paths in Figure 4.4 are summarized in Table 4.1. The measurement of each of the constructs is as defined throughout this chapter. These definitions are summarized in Table 4.2. In the next chapter, this research model is analyzed and discussed.

Table 4.2 Constructs and Measures

Construct	Manifest Variables	Formative or Reflective
1. Prior Entry Experience	Software Related General Entry Experience	Formative
2. Concentration Ratio	Installed Base Projected Purchases	Reflective
3. Number of Competitors	Advertisements Data Sources	Reflective
4. Sources of Advantage	Number of Employees Yearly Sales	Formative*
5. Timing of Entry	Months Since First Entrant Number of Prior Entrants	Formative
6. Distribution Investment	Sales Direct Sales in Retail Outlets Sales via Mail order Firms Shareware	Reflective
7. Advertising Investment	Volume in PC Magazine Number in PC Magazine Volume in PC World Number in PC World Volume in Byte Number in Byte	Reflective
8. Quality	Editor's Choice Number of Features	Reflective
9. Compatibility	Hardware Import/Export Facilities	Formative
10. User Friendliness	Helpful Features	Formative
11. Price	Relative Retail Price Discounted Price Relative Lowest Price	Reflective
12. Magazine Coverage	Very Favorable Reviews Favorable Reviews Mixed Reviews Unfavorable Reviews Other Citations	Formative
13. Copy Protection	Proportion of Firms Without It or Zero if Copy Protected	Formative
14. Performance	Business Citations Industry Citations Expected Market Share Installed Base Market Share Personal Word Processor Company's Top Three WPs If Change--To What WP?	Reflective

*Changed to reflective during data analysis for empirical reasons.

CHAPTER FIVE
DATA ANALYSIS AND DISCUSSION OF RESULTS FOR WORD PROCESSING

Introduction

All data and analysis discussed in this chapter pertain to the word processing product market. The model evolution for PLS analysis and the results from the revised model are discussed in detail. Most of the hypothesized relationships in the entry strategy performance model are supported. The data provide strong support for the entry strategy performance model.

Data Collection

The data were collected for the word processing category of software. Table A.1 (in the Appendix) lists the steps undertaken in collecting the data needed to complete the analysis. Table A.2 (also in the Appendix) lists the steps required to prepare these data for analysis in PLS.[1]

Structural Equation Modeling

Hypothesis or model testing is contingent on the quality of the measures used during the test. Unless the constructs are measured in a reliable and valid way, any testing is meaningless. Even though the structural and measurement models are simultaneously estimated, the assessment of the measures used is necessary before any conclusions can be reached regarding the hypotheses of interest. Structural equation modeling allows the researcher to make a separate examination of both the measurement and the structural model. If the measures are good, then the hypothesized theoretical relationships can be examined with confidence.

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[1] These same steps would apply for any of the microcomputer software product markets.

Structural equation modeling also allows the researcher to use multiple measures of a construct. The multiple measures more fully reflect the complexity of many constructs. A single measure may tap only one portion of the domain of a construct. This is often the reason that research results vary from one study to another when the researchers have postulated the same theoretical relationships between constructs. The theories are the same, but results differ because either the measures are not consistent (they tap different aspects of the same theorized domain or even different domains) or the measures are not reliable. Either way the results may not be replicable. With multiple measures, and the ability to assess the measurement model, overall measurement error decreases and reliability increases. Structural equation modeling techniques such as PLS and LISREL allow the researcher to use multiple measures, thus providing a richer, more complete measure of the constructs of interest.

Finally, structural equation modeling techniques such as PLS enhance the validity of the constructs because all measures of all constructs are estimated simultaneously. Just as some words have different meanings in different contexts, so do different constructs.

It is necessary to assess the measurement model before proceeding to the structural analysis. When the researcher is satisfied that substantial reliability and validity exist, assessment of the structural model may begin. With valid and reliable measures a strong test of the model follows.

PLS Modeling Results

The details of the structural equation analysis, PLS, are discussed in this section. After the research model is fully specified and estimated, the multiple measures and the entire measurement model are assessed. As the measures are acceptable, an evaluation of the structural relationships is discussed.

Model Specification and Evolution

Original Research Model. The research model (Figure 4.4 and Table 4.1) developed and discussed in the last chapter is examined using partial least squares analysis. Unfortunately, the analysis could not proceed because an inverted matrix was not 'positive definite'. An inversion is not possible if a determinant is zero, i.e., a singular matrix. This occurs if there is linear dependency in the matrix, that is, if one variable is a linear combination of any of the others. Solutions to this problem would be to either 1) drop the offending measure(s) from the model or 2) if the singularity was occurring within a single formative construct, make the indicators reflective.

For both constructs 'Timing of Entry' and 'Sources of Advantage' the correlations between the manifest variables are quite high. Partial least squares was rerun three times. Each time one manifest variable was eliminated from one, then the other, then both constructs. The results were still the same: inversion matrix not positive definite. It was, therefore, assumed that the problem existed someplace else within the model. Examination of the competitive positioning variables was then undertaken.

The high level construct (Figure 4.3), competitive positioning, was translated into quality, compatibility, user friendliness, copy protection, and price constructs (Figure 4.7 and Figure 4.4). Quality was measured by two manifest variables: editor's choice and number of features. Compatibility, user friendliness and copy protection are also features of the software packages. They were specified as separate constructs in the model as it was believed that these particular features may be more important than others in the software industry. It appeared likely that they were highly related to the number of features variable for quality and could be causing the problem.

To test the possibility that the separate features constructs were too interrelated to provide a stable solution, all the features constructs

were collapsed into the number of features construct. This was done by developing a new ratio for the number of features. The numerator was recalculated by adding together the number of features for the program from the constructs: compatibility, user friendliness and number of features. In addition, a one was added to the numerator if a program did not have copy protection. The denominator was similarly calculated. In this manner all the features constructs were combined into one manifest variable: number of features. This more parsimonious model now contains only two competitive positioning constructs: Quality and Pricing. It is diagrammed in Figure 5.1.

These changes make the model more generalizable to other industries. Every construct, except possibly magazine coverage or publicity, is appropriate for the study of any industry.

Preliminary Measurement Model: Problems and Suggestions for Improvement. Table 5.1 provides the details for the measurement model of the entry strategy performance model being examined here (Figure 5.1). Hereafter it will be referred to as the original model. An examination of the table indicates that a few measures are less than perfect. Before examining the model in detail it is important to remember that the collection of data from many sources may contribute to variability in the measures. The use of a single measurement method, such as questionnaires, may give higher reliabilities and greater variance explained than the multiple sources used here. Somewhat lower reliabilities may be expected with very different measures. Nevertheless all constructs were examined when established standards were not met. The cutoff levels for acceptable measures are .60 for the composite reliability (Bagozzi and Yi 1988) and .50 for the average variance extracted (Fornell and Larcker 1981). If the values were less than the cutoffs for any construct all the measures and any necessary action are discussed.

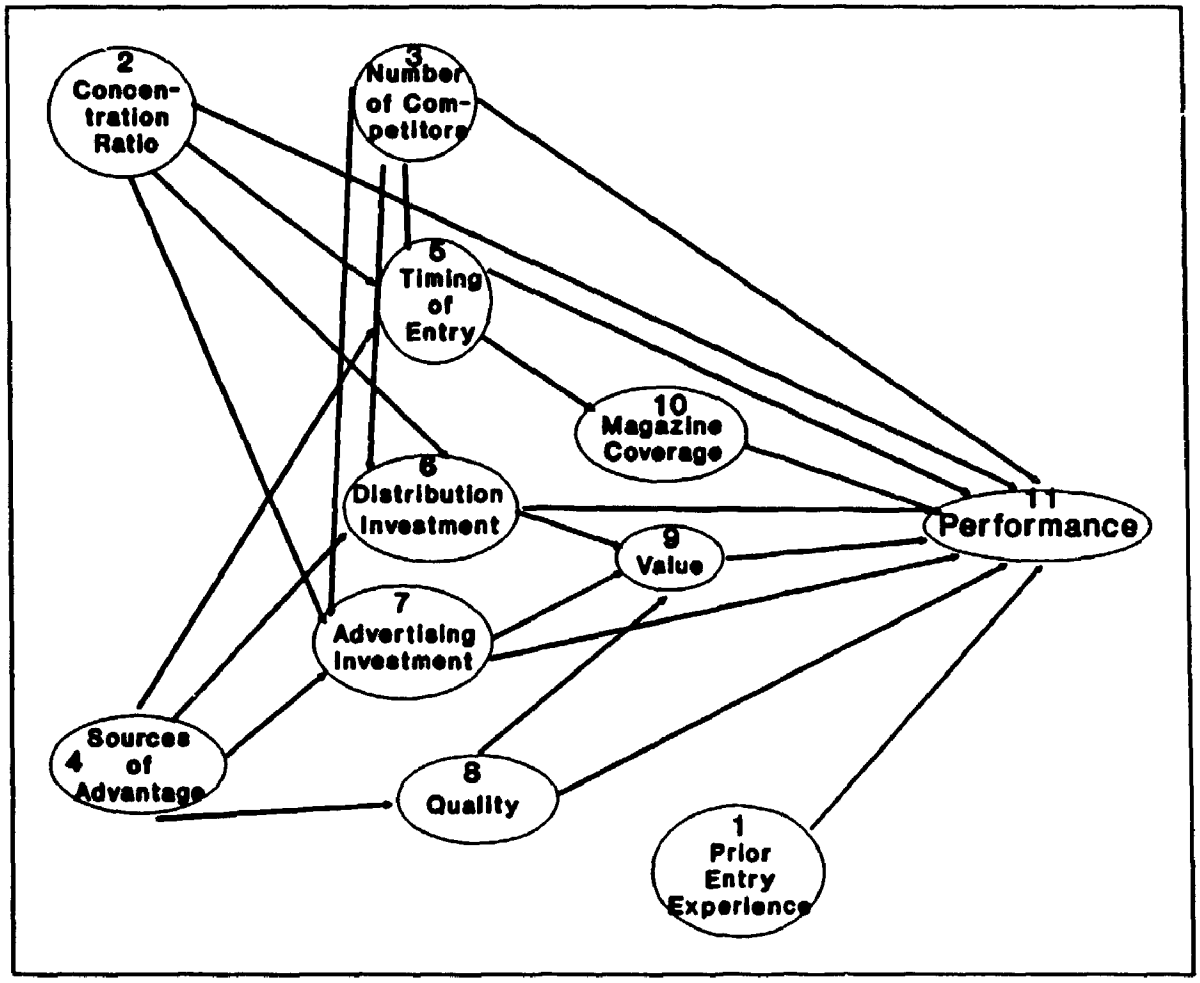

Figure 5.1 Entry Strategy Performance Model for the Microcomputer Software Industry: Research Model

The coefficients for formative indicators are estimated as regression weights and the manifest variables are combined into a latent construct using these weights. The coefficients for reflective indicators are established through a series of simple regressions. Some authors suggest the relevance of interpreting the weights for formative indicators (unless there is high multicolinearity--which is likely with multiple measures of the same construct) and loadings for reflective indicators since this is the way they were estimated. Wold (1982) suggests examination of both the loadings and the weights as they measure different aspects of each measure's contribution to explained variance.

Table 5.1 Measurement Model

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
1 Company Entry Experience			.505*	
Software Related	-.092	.027	.001	.496
General	1.007	.996	.992	
2 Concentration Ratios			.990*	.980
Installed Base	.584	.993	.986	
Projected Purchases	.425	.987	.973	
3 Number of Competitors			.141*	.683
Advertising Data	-.266	-.649	.421	
Data Sources	.852	.971	.944	
4 Sources of Advantage			1.000*	1.000
Employees	.500	1.000**	1.000	
Dollar Sales	.500	1.000**	1.000	
5 Timing of Entry			.999*	.999
Months	.614	1.000	.999	
Competitors	.386	.999	.998	
6 Distribution Investment			.612*	.412
Direct Sales	-.009	-.087	.008	
Retail Sales	.506	.874	.763	
Mail order Sales	.605	.907	.823	
Shareware	.037	.232	.054	
7 Advertising Investment			.679*	.321
PC Magazine Ad Volume	.098	.412	.170	
PC Magazine No. of Ads	.514	.774	.598	
PC World Ad Vol.	.328	.688	.473	
PC World No. of Ads	.399	.750	.562	
Byte Ad Volume	-.158	-.009	.000	
Byte No. of Ads	.105	.347	.120	
8 Quality			.770*	.627
Editor's Choice	.589	.760	.578	
Features	.672	.822	.675	
9 Pricing			.450*	.423
Relative MSRP	.259	.544	.295	
Discounted Price	.881	.942	.887	
Relative Mail order Price	-.102	-.295	.087	
10 Magazine Coverage			.487*	.242
Very Favorable Reviews	.549	.653	.427	
Favorable Reviews	.374	.554	.307	
Mixed Reviews	-.282	-.013	.000	
Unfavorable Reviews	.209	.342	.117	
All Other Citations	.601	.597	.356	

Table 5.1 (continued) Measurement Model

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
11 Performance			.968*	.849
ABI/Inform Citations	.151	.924	.854	
Microcomputer Index Citations	.169	.947	.897	
Expected Market Share: Software Magazine	.144	.908	.825	
Installed Base MS: Software Magazine	.140	.901	.811	
Personal Use WP: PC Mag survey	.166	.957	.915	
One of Company's Top Three wps: PC Mag survey	.168	.987	.973	
If Change WP--to What? PC Mag survey	.146	.816	.666	

R-Square on Performance = .795

*This value is the composite reliability of the construct, or its internal consistency.

**The factor loadings for sources of advantage may be a little high since six of the dollar sales values were estimated, using regression analysis, from the number of employees.

Note: the latent weights are bolded where the indicators are formative, the loadings are bolded where the indicators are reflective.

> The weight w_h and the loading ρ_h of an indicator x_h are complementary measures for the relevance of x_h as compared with other indicators $x_{h'}$ in the same block. Speaking generally, the loading ρ_h measures the separate contribution of x_h to the relevance of its LV. The weight w_h measures the contribution of the indicator x_h to the joint relevance of the indicators in the same block. (Wold, 1982, p. 18)

Wold (1982) goes on to say that if both the weights and the loadings are low, the measure should be removed from the analysis because it contributes more to error than it does to explained variance. This is the criterion used for removal of a measure in this study.

The cross loadings were also examined for each of the measures. For all but two sets of constructs (entry experience and number of competitors) the measures only loaded highly on the construct to which they had been originally assigned. (This will be discussed in those sections.)

This supports face or content validity of the measures as most measures converge on the construct to which they were assigned. Discriminant validity is also suggested as the measures did not load on the other constructs. Other validity issues will be discussed once the measurement model has been fine-tuned.

Beginning at the bottom of the Table and working back to the top (from performance upwards) the constructs and their measures are examined. Only those constructs requiring some discussion or action are discussed.

Magazine Coverage. The composite reliability is slightly lower than suggested while the average variance explained is only 24%. It was expected that the very favorable reviews, favorable reviews and other citations would have a positive loading on magazine coverage, while the other measures would load negatively. However, both the weights and the loadings for the mixed and unfavorable reviews are low.

The most likely explanation is that positive reviews promote sales. Because consumers try to purchase the top ranked packages retailers stock them. This greater availability also boosts sales from those who decide on their purchase in the store. Negative and mixed ratings, on the other hand, are unlikely to generate much action by consumers or retailers. If the product is a relative unknown, it is likely to remain so. If it already has an established reputation, some sales will continue as a result of product preference, in spite of the poor reviews. Mixed and unfavorable reviews simply do not seem to provide consumers as much relevant information as the positive reviews do.

Action: The mixed reviews and unfavorable review measures are therefore dropped from further analysis.

Pricing. The variable relative low price or relative mail order price has a low weight and a low negative loading on the pricing construct. The price of the lowest priced word processing package is not consistent across the various time periods and various reviews (as is the highest relevant price). The quality of the lowest priced product also

varies across the reviews. For these reasons it is likely that across time and the various software reviews this measure does not consistently measure the same thing. It, therefore, not only has low reliability but also poor validity.

Action: This measure is eliminated in the revised model. Dropping this measure also changes the meaning of the construct from "pricing" to "value". This is discussed in more detail later in the chapter when the structural hypotheses are discussed.

Advertising Investment. This construct originally included six measures: the size, volume and number of ads from each of three magazines: PC Magazine, PC World, and Byte. The loadings and weights for the Byte ads are low. This does not come as a surprise to the researcher. Byte magazine is not specifically targeted to users of personal computers, much less only IBM compatible computers. Also fewer ads were placed in Byte than in the other two magazines. The Byte word processing ads represented only about 12% of the word processing advertisements from all three magazines.

Action: The Byte advertisement measures are dropped from further analysis.

Distribution Investment. The direct sales and shareware measures have both low loadings and low weights on the distribution investment construct. This is not too surprising. In order to establish both retail sales and mail order sales the software company would have to invest time and money in establishing links with these outlets. Their high loadings are to be expected. On the other hand, direct sales could include a wide divergence in expenditures from a shipping clerk who responds to mail-in requests to a full-time sales force who actively call on prospective buyers. The direct sales measure does not reliably measure a 'large' investment on the firm's part and is dropped from later analysis.

Shareware implies a very low distribution investment. A code of 1 shows that the program is not shareware. The firm is investing more than

shareware firms in distribution. It is likely that the loading for this construct is low for several reasons. First, few shareware programs are included in the data set as few meet the more complex demands, quality and service required in a business environment. Second, firms vary widely in their distribution investment. A '1' rating (which 92% of the cases have) includes this wide variety of distribution expenditures--anything other than shareware. Yet the variance on this variable is low. Third, this variable should be highly related to two measures: retail and mail order sales because if a firm sells via shareware its product would not be sold in either retail stores or by mail order firms. The low loading, however, probably arose because the few shareware programs in the data set did not allow this relationship to be exposed. For the reasons stated it is, therefore, not surprising that this measure does not reliably measure investment in distribution.

Action: The measures 'direct sales' and 'shareware' are, therefore, eliminated from further analysis.

Number of Active Competitors. This construct has high loadings but the reliability is low because the measures have opposite signs. The opposite signs have likely arisen because the two measures are either capturing different dimensions of the construct or are measuring two different constructs.

Both measures have face validity as to the number of competitors a particular software package faces during the entry period. The number of competitors from the advertising data reflects only the business class word processors which advertised in either PC Magazine, PC World, or Byte.

The Data Sources measure, on the other hand, is the number of companies selling a DOS compatible word processor. This measure taps more potential competitors. Unlike the former measure it is not restricted to only business class word processors and no investment (e.g., advertising) is required for inclusion. The Data Sources measure of number of competitors loads equally well on the timing construct (.973).

The data were collected annually from Data Sources. As entry did not occur only in the one month of the year in which the incremental number of competitors listed annually in Data Sources were prorated over the prior twelve months. This method, with its regular rate of entry across each year, may account for the similarity between this measure and the straight passage of time. Accordingly, the high loading for this measure on timing and the large correlation (.899) between the two latent constructs are not too surprising!

If two measures are assessing the same underlying construct and simply have different metric measure the two would give comparable results in response to the same stimulus. An example would be measuring different lengths of boards with both a metric and an English yardstick. If the results of both are graphed, the lines would align perfectly. If there is a slight measurement error, but both are measuring the same thing, the lines will tend to be similar. An example of the latter are the two timing measures in this study (Figure 4.9). For this construct the two measures for the number of competitors are quite

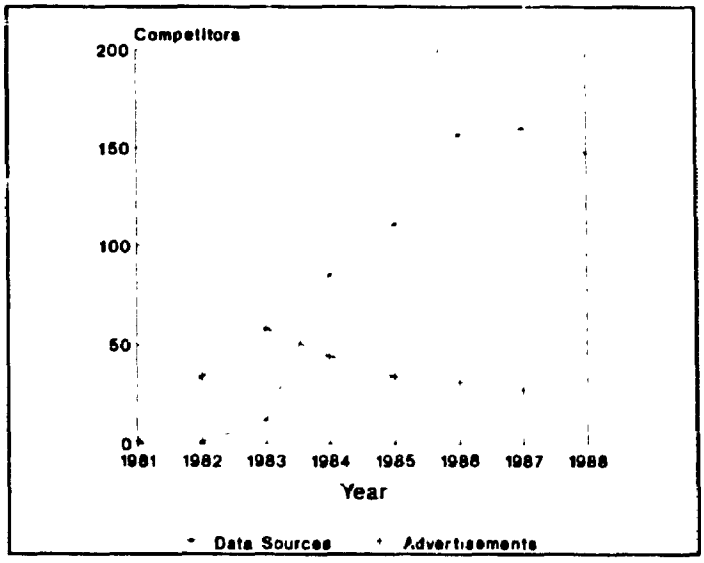

Figure 5.2 Number of Competitors Measurement Scales

different as can be seen in Figure 5.2[2]. They do not appear to be tapping the same underlying construct.

Action: The Data Sources measure of number of competitors is excluded from additional analysis as it appears to be measuring something other than what was intended. It acts like another timeline, perhaps another measure of the timing of entry, not the product market characteristic number of competitors. The advertising measure tracks the advertising propensity of the competitors in the industry through time. The construct being captured might, therefore, be more appropriately be referred to as the "number of active competitors".

Company Entry Experience / Sources of Advantage The correlation between the latent constructs, entry experience and sources of advantage, as originally defined is .957. The measures 'general entry experience', 'number of employees', and 'dollar sales' all load together highly (on both entry experience and sources of advantage constructs). There is a logical reason for this. Company entry experience is a skill of a company and a source of advantage to it. Larger firms also tend to have been in business longer thus accumulating more entry experience.

According to Day & Wensley a firm's sources of advantage include its skills or distinctive capabilities and its resources. Included in the operational definition of sources of advantage are two measures: the number of employees and dollar sales. The first is a surrogate for employee skills and the second for available resources.

Established business and marketing skills of both a general and industry specific nature are included in the model as a separate construct

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[2] Usually in research of this kind it is not possible to examine the measurement scales to see how closely they align. This has to be inferred from the association between the various measures in a model. In this study, however, it is possible to examine the two measurement scales. The number of competitors was calculated for the entire period 1981 through 1987 for both types of measures. The indicators included in the PLS analysis were the measures on these scales at the time of entry of each product. As the entire scales were developed before the measures could be taken, they are available for review.

called entry experience. These measures of prior experience are surrogates for the skill levels the prior experience represents. That is, using Day & Wensley's definition of sources of advantage, they too are sources of advantage. The empirical evidence and the constructs' definitions argue for one construct. The skill measure surrogates (entry experience and number of employees) and resource measure surrogate (dollar sales) should be included the construct, sources of advantage.

The software-related entry experience measure has very low loadings, not just on this construct, but on all others in the model. This measure accounts for very little, if any, of the variance in the entire entry strategy performance model. From the data it is impossible to tell if this lackluster performance is because the measure is poor or because software entry performance is unimportant.[3] Either way, it does not contribute much to the explained variance in the model.

Action: The two constructs are collapsed into one latent variable, sources of advantage, with three manifest variables. The manifest variable for software entry experience was dropped from the analysis. This was for empirical reasons only. It would also be included in the construct, sources of advantage, if the measure were more reliable.

Revised Research Model. Incorporation of the actions listed led to a slightly revised research model: the construct, prior entry experience, was dropped from the model. The poorer measures, as discussed, were dropped from the analysis. These actions reduced the number of latent constructs from eleven to ten and the number of manifest variables from 37 to 28. Figure 5.3 shows the revised research model. The arrows indicate the hypotheses being tested.

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[3] An attempt was made to develop an interval scale measure for software related entry experience. If this was not achieved, this may explain some of the poor showing of this measure.

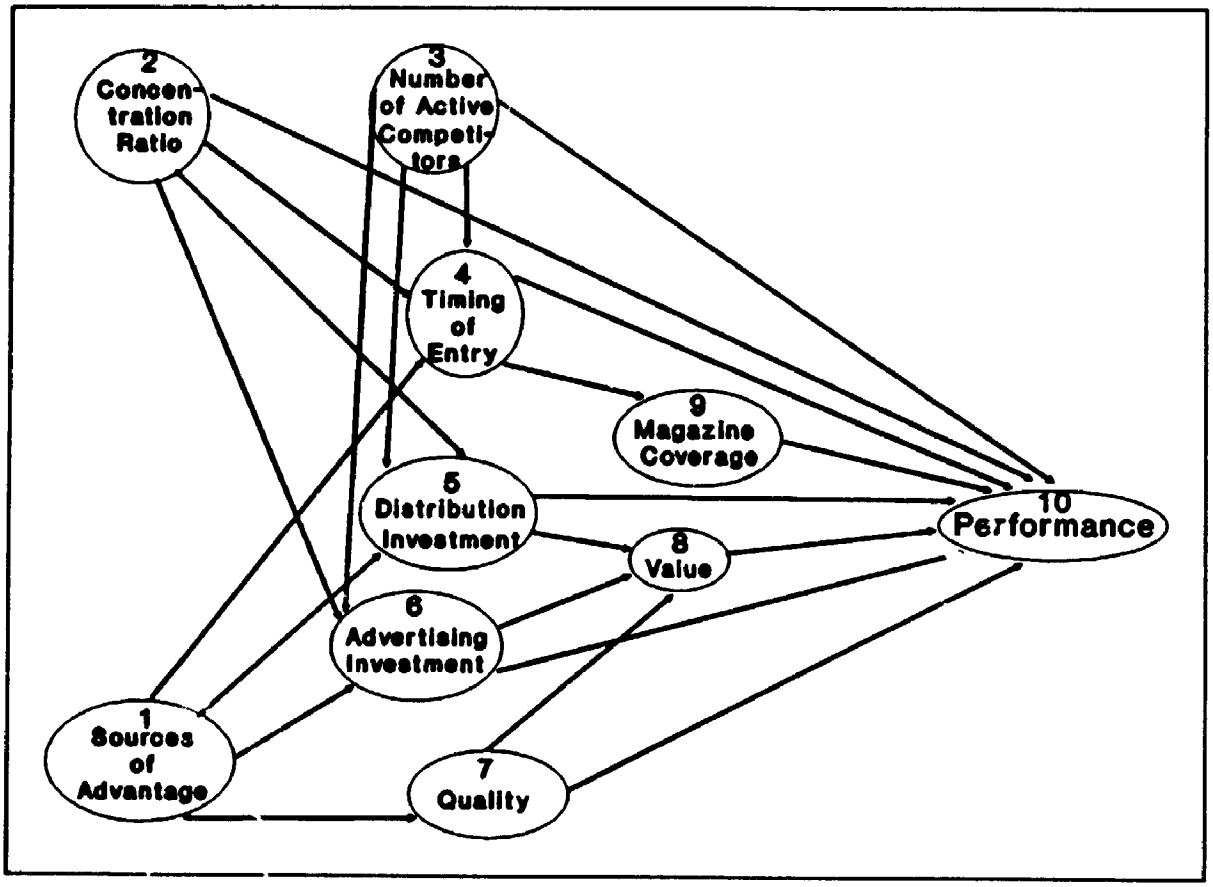

Figure 5.3 Entry Strategy Performance Model for the Microcomputer Software Industry: Research Model

Measurement Model Evaluation: Reliability and Validity of Measures

The researcher needs to examine each construct (latent variable) for construct validity. Construct validity "is the degree to which a measure assesses the construct it is purported to assess" (Peter 1981, p. 134). Construct validity must exist before the hypothesis testing or structural model is examined. Existence of construct validity requires an assessment of the reliability of the measures and various other 'types' of validity (e.g., content validity, convergent validity, and discriminant validity). These are discussed in the next few sections.

Table 5.2 summarizes the measurement model used in this study. Latent weights for the measures are displayed in column one. The second column shows the factor loadings for each measure on its construct. The

Table 5.2 Revised Measurement Model

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilties	Portion of Variance Extracted
1 Sources of Advantage			.993*	
General Entry Experience	.310	.979	.959	.981
Number of Employees	.350	.996	.992	
Dollar Sales	.350	.996	.992	
2 Concentration Ratios			.990*	.980
Installed Base	.559	.992	.984	
Projected Purchases	.451	.988	.976	
3 Number of Active Competitors			1.00**	
Advertising Data	1.00**	1.00**	1.00**	1.00**
4 Timing of Entry			.917*	.848
Months	6.750	.930	.865	
Competitors	-5.831	.905	.819	
5 Distribution Investment			.885*	.848
Retail Sales	.510	.870	.757	
Mail order Sales	.610	.911	.830	
6 Advertising Investment			.738*	.451
PC Magazine Ad Volume	-.039	.248	.061	
PC Magazine No. of Ads	.284	.540	.292	
PC World Ad Vol.	.490	.834	.696	
PC World No. of Ads	.516	.868	.753	
7 Quality			.770*	.627
Editor's Choice	.593	.763	.582	
Features	.668	.819	.672	
8 Value			.714*	.582
Relative MSRP	.265	.478	.229	
Discounted Price	.904	.966	.934	
9 Magazine Coverage			.678*	.408
Very Favorable Reviews	.615	.710	.504	
Favorable Reviews	.297	.562	.316	
All Other Citations	.625	.636	.404	

Table 5.2 (Continued) Revised Measurement Model

Construc / Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
10 Performance			.975*	.849
ABI/Inform Citations	.152	.924	.853	
Microcomputer Index Citations	.171	.948	.899	
Expected Market Share: Software Magazine	.141	.907	.823	
Installed Base MS: Software Magazine	.138	.900	.809	
Personal Use WP: PC Mag survey	.166	.957	.916	
One of Company's Top Three wps: PC Mag survey	.168	.987	.974	
If Change WP--to What? PC Mag survey	.147	.817	.667	

R-Square = .818

*This value is the composite reliability of the construct, or its internal consistency.
**1.0 is by definition as only one measure was included for this construct.

Note: the latent weights are bolded where the indicators are formative, the loadings are bolded where the indicators are reflective.

reliabilities are listed in the third column. Where a single measure represents a construct, the reliability of the item is 1.0. (This is the same assumption used for all variables in a regression analysis.) Also shown in the table is the composite reliability for each scale (Fornell and Larcker 1981). The final column lists the average variance extracted. These results are discussed in the next few pages as reliability and validity issues are addressed.

Content Validity. Before reliability is assessed it is important that all the measures in the constructs have face or content validity. That is, do the proposed measures likely exhibit the construct of interest? Specific measures are chosen to represent each of the constructs. Consideration is given to the theoretical definition of the constructs and the proposed environment (microcomputer software industry). In this

research project, face validity was assessed and found to be acceptable prior to the data collection.

Reliability. Reliability is a necessary but not sufficient condition for validity. An instrument may be reliable (e.g., an odometer may always provide an accurate measure of the number of revolutions per minute) but may not gauge the true value of the construct of interest (e.g., speed in this example).

The formula given by Fornell and Larcker (1981) is used to calculate the reliabilities of each of the measures.[4] ρ_y is a derivation of the classical reliability measure for cases where all variables have been standardized. The expected value for all variables is zero, the true score is independent of measurement error and individual measurement errors are independent. This is the assumption in the PLS analysis undertaken in this study.

The third column in Table 5.2 lists the reliabilities for each of the measures. It is not the reliability of a single item that is important, but the composite reliability of the scale. Bagozzi and Yi (1988, p. 80) state: "Individual item reliabilities will be lower than the composite, but it is not possible to suggest even loose rules-of-thumb as to adequate sizes." The composite reliability ($\rho\eta$) provides a measure of internal consistency for the latent variables. The formula used in this study is the one suggested by Fornell and Larcker (1981)[5]

Nunnally (1978) suggests that for basic research a reliability value of .7 is desirable. Nunnally's rule of thumb was suggested in the context of 1) first generation data analysis techniques and 2) 'measurement scales' developed with many similar measures (simply different questions on a test); neither of these apply here. A more lenient rule of thumb has been suggested for structural equation models.

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[4] This formula is provided in the Appendix.

[5] This formula is provided in the Appendix.

Bagozzi and Yi (1988) state that values of composite reliability greater than .6 are desirable. Second generation data analysis techniques often employ measures which are quite varied in both the measures themselves and their source. Together these compose or reflect the latent construct. This is one likely reason for the lower reliability requirements.

The composite reliabilities for each of the constructs meet the .6 minimum rule of thumb (Table 5.2). The composite reliabilities vary from a low of .678 for Magazine Coverage to a high of .993 for the Sources of Advantage construct.

Average Variance Extracted. Neither of the reliability measures discussed (ρ_y and ρ_x) assess the relative variance in the items captured by the construct in relation to the amount of variance attributable to measurement error. Fornell and Larcker (1981) suggest the examination of the average variance extracted (AVE) for this assessment. Fornell and Larcker (1981) suggest that if the value is less than .50 (more than 50% error), doubt is cast on the validity of the construct. The equation for the average variance extracted is shown in the Appendix.

The last column of Table 5.2 lists the AVE for each construct. For all except one, the AVE (rounded to one decimal place) is .5 or better.[6] The one exception is the Magazine Coverage construct. Although its AVE is only .41, the construct remains in the model because it meets all the other criteria for a well-measured construct.

As the measures for all the constructs are internally consistent (i.e., reliable) and explain more variance than error (with the one exception), validity can now be assessed.

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[6] Advertising Investment has an AVE of .451. The PC Magazine ad volume measure was not deleted, although low. This was done for two reasons 1) to retain consistency (two measures for each of the magazines included as advertising investment measures) and 2) because of the importance to the industry of PC Magazine as a buyer's reference guide. (The removal of this measure would have raised the AVE to over .5.)

Convergent and Discriminant Validity. Convergent validity is the relationship between multiple measures purporting to measure the same construct. If the measures are highly related, convergent validity is said to exist. The high composite reliabilities discussed in the last section support the finding of convergent validity.

Other indicators of convergent validity are the correlations between the various measures or manifest variables. Included in the Appendix are correlation matrices for each of the major constructs in the revised model. All the measures which were collected and used in the original model are listed. For most of the constructs the measures that are most highly correlated with each other are also those which loaded most highly on the constructs. Only two constructs are exceptions to this rule: pricing and magazine coverage. Discriminant validity requires that a construct or a measure **not** correlate too highly with constructs or measures from which it is supposed to differ.

Also, the variance shared between constructs should be less than the variance shared between a construct and its measures. That is, R^2 between the constructs should be statistically lower than $vc(\eta)$, the variance shared between a construct and its measures (Fornell, Tellis and Zinkhan, 1982). This is the case for all except one construct, magazine coverage. It is the construct with the lowest variance extracted ($vc(\eta)$ or AVE). The AVE is slightly smaller than the R^2 between it and distribution investment and pricing. However, its AVE is higher than the R^2 with six of the eight other latent variables.

In partial least squares analysis, convergent validity and discriminant validity can be assessed by an examination of the loadings and cross loadings of the measures on the various constructs. When the highest loadings of a measure match the construct to which they have been assigned, convergent validity is indicated. Similarly, discriminant validity is supported when those measures do not load highly on other constructs.

The loadings and cross loadings support both discriminant and convergent validity for all the constructs. For all the constructs in the revised model each of the measures loaded much higher on its own construct than on any of the other constructs. Each latent variable is now distinct.

This analysis confirms convergent and discriminant validity for all the constructs. Even the construct with the smallest AVE meets most of the convergent and discriminant validity tests. It is, therefore, concluded that all the constructs are reliably and validly measured.

Summary of Measurement Assessment. The revised measurement model is composed of valid reliable measures. The analysis of the structural model may now proceed with confidence that the constructs are measuring what they are intended to measure and are doing so reliably.

Structural Model Evaluation

Assessment of the structural model is also an assessment of nomological validity. "Nomological validity (lawlike) is based on the explicit investigation of constructs and measures in terms of formal hypotheses derived from theory" (Peter 1981, p. 135). For partial least squares this entails an examination of the hypothesized paths between constructs and an assessment of the overall model. In the rest of this section the PLS results for the implicit and explicit hypotheses present in the entry strategy performance model are discussed.

A summary of the relationship between each of the independent latent constructs and the dependent construct, performance, is presented in Table 5.3. Besides the direct effects (the path coefficients), the t-values for the path coefficients, the indirect effects, the total effects (the reduced path coefficients), and the correlations between the constructs and the dependent construct, performance, are reported. The t-values were calculated using the jackknifing technique (Fornell and Barclay 1986). All the direct paths into performance are significant (Table 5.3). These

Table 5.3 Results of PLS Modeling: Revised Model

Antecedent Construct	Standardized Path Coefficient (Direct Effects)	t-value	Indirect Effects	Total Effect	Correlation
1. Sources of Advantage	0	----	-.097	-.097	.200
2. Concentration Ratios	.089	26.8	-.076	.013	.047
3. Number of Competitors	.021	9.0	.026	.047	.071
4. Timing of Entry	.022	5.5	-.266	-.232	-.245
5. Distribution Investment	-.431	-119.2	.200	-.231	.353
6. Advertising Investment	.141	19.8	-.023	.118	.284
7. Quality	.357	73.9	.061	.418	.511
8. Value	.328	75.6	---	.328	.568
9. Magazine Coverage	.732	56.4	---	.732	.767

The R-Squared with Performance as the dependent construct .818.

path coefficients and all the others hypothesized in the research model are also presented in Figure 5.4.

Timing:

T1: The earlier the entry, the better the performance. Although the direct path is significant and positive, the total effect is negative. That is, earlier entries are associated with better performance. This hypothesis is also supported by the negative correlation between timing and performance (Table 5.4). These results show that it is not sufficient to examine the direct paths between two constructs. A construct may work through or with other constructs making the total effect of it different from its direct effect.

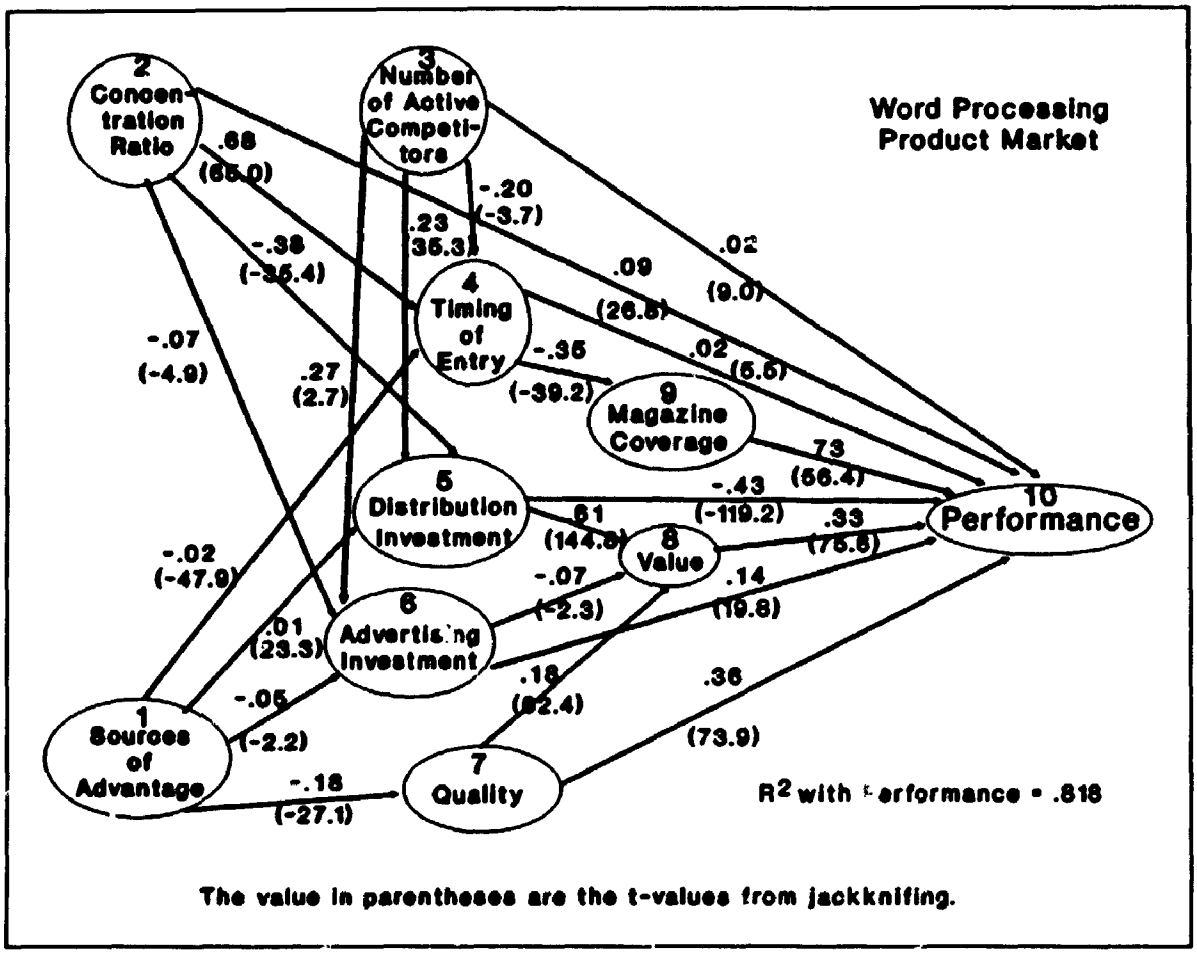

Figure 5.4 The Structural Model: Path Coefficients and t-values.

T2: The earlier the entry, the greater the magazine coverage. As expected there was a significant negative path between timing of entry and magazine coverage. With fewer products in the market in the beginning it was easier to get magazine coverage because 1) there were fewer competitors clamoring for space and 2) readers were hungry for information about new and better software for their machines.

Magnitude of Investment:

AI1: The larger the advertising investment, the higher the performance.

A larger investment in advertising was associated with better performance. This shows up in all three strength measures: the direct effects, the indirect effects, and the correlation between

the advertising investment and performance. The higher a firm's advertising investment, relative to its competitors, the better its performance.

DI1: The larger the distribution investment, the higher the performance.

This hypothesis is not supported. The significant path coefficient and the total effects show a negative relationship between investment and performance. On the other hand, the indirect effects and the correlation between distribution investment and performance show the expected positive relationship.

One reason for these results may be the difficulty in interpreting the true meaning of the distribution investment construct. It has two measures: retail sales and mail order sales. Both are simply coded with a one or a zero depending upon whether or not a firm sells through these channels (and hence presumably has invested in developing these channels). The range in investment possibilities for each channel is large. The measures undoubtedly provide only a very rough guesstimate of investment in these areas.

AI2/DI2: A firm which invests more in distribution and advertising is likely to have a higher priced product. Although value, not price, is included in the model, the same directional relationship would be posited: **A firm which invests more in distribution and advertising is likely to have a higher value product.**

There is a significant positive path between distribution investment and value. There is a slightly negative path between advertising and value. These results make sense within this product market.

The positive relationship between distribution investment and value was supported because it was generally only the expensive, high value word processors that entered the market with either retail or mail order availability. Lower priced products evidently

could not as easily break into these distribution channels. This is likely because the margins available to resellers would be lower.

Products only available directly from their companies would need to advertise to get orders. These products were generally lower priced than those sold in retail outlets or through mail order. Thus, the negative relationship between advertising investment and value.

Competitive Positioning:

Better competitive positioning provides the customer with better value which results in better performance. This general hypothesis was divided into two hypotheses about the two major components of positioning: quality (Q1) and value (V1).

Q1: The higher the relative quality of the product at entry, the better the performance of a product.

This hypothesis was strongly supported in the model with high path coefficients (and a high correlation) between quality and performance.

Q2: Higher quality products have higher prices.

A significant path between quality and value support this hypothesis.

P1: Higher prices reflect higher quality and should result in better performance.

It is necessary to interpret the loadings to determine the meaning of the "pricing" construct. The higher the loadings on the construct, the more its meaning is formed from those manifest variables. The discounted price measure loads highest on this construct. Larger values on this indicator represent larger discounted prices, greater customer value in the corsumer's mind. The second highest loading is for the relative MSRP. The higher the value on this indicator, the higher the relative list price. The positive loading supports the contention that price (MSRP) is used

in this industry to denote quality products (Proposition 4 from the literature review.)

The "pricing" construct, as a whole, appears to be more accurately measuring customer value through large discounts and quality products. It does not measure relative pricing, per se, but relative customer value. The following hypothesis is, therefore, a more appropriate interpretation of the path in the model between relative value and performance:

V1: Higher relative product value at entry leads to better performance.

This hypothesis is the general conclusion from the literature. It was not included as a proposition as 1) it is generally well accepted as a basis for good performance and 2) it is the general form from which propositions 3 and 4 were derived. These were included in the entry strategy performance model. This hypothesis is strongly supported in this model.

Prior Entry Experience:

PE1: The more prior entry experience the entrant's firm has at entry, the better the entry performance.

In the final model this construct did not exist. One of the measures (similar entry experience in software) was deleted as a poor measure. General entry experience was reclassified as a source of advantage in the revised model. It is discussed with the other sources of advantage.

Company Characteristics / Sources of Advantage:

The three measured sources of advantage, general entry experience, human capital and capital base, all load very highly (Table 5.2) on sources of advantage.

SA0: A greater resource base will lead to better performance.

In the model it was not hypothesized that sources of advantage would have a direct effect on performance. They, however, could affect performance indirectly through quality, advertising

investment, distribution investment, and timing. As Table 5.4 indicates the total effect between sources of advantage and performance is -0.097. This contradicts the hypothesis. This result is likely because some of the firms entering the word processing product market were quite small at the time of entry and they entered the market early in its product life cycle. Early entry into the market meant that barriers to entry, requiring a lot of resources, had not yet developed in the industry. In this market it appears that not only did smaller, less experienced firms not suffer any disadvantages, they appear to have had an advantage in this market.

Part of the explanation for this result is that the smaller firms could immediately take advantage of the current technology. They did not have to worry about protecting old cash cows and could move very quickly. This allowed them to enter the market with higher quality products.

SA1: Larger sources of advantage[7] will result in higher quality products.

A significant negative path indicates that the opposite is supported in this industry. This is not too surprising. Very large corporations have a reputation for being conservative, for having decisions watered down by committees, and for being cautious. The largest corporations to enter the word processing product market, IBM and Wang, entered the market late with inferior products. They were tied to old products (dedicated word processors) and were too cautious to jump in, develop and market state-of-the art products. For the most part they did not want to destroy their old cash cows

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[7] The three measures of sources of advantage are surrogates for the abilities these measures represent. For this hypothesis 1) a greater number of employees is a surrogate for a greater ability to produce high quality products; 2) more years in business represent a greater ability to recognize and produce quality products; and 3) more capital provides more resources to invest in developing better quality products.

and, as a result, missed the window of opportunity in the new microcomputer market place.

SA2: The greater a firm's sources of advantages at the time of entry, the greater the investment expected in both distribution and advertising.

Both the paths (.01 for distribution and -.05 for advertising) are small but significant. There are a couple of reasons for these results. First, advertising is not that expensive in the media measured so that available resources may not have proven to be a constraint. Secondly, the measure for distribution is a gross measure and does not capture the full range of true expenditures.

SA3: The greater the skills and resources of a firm, the later the likely entry.

Although significant, the negative path is very small. This means that firms with greater skills and resources had a slight tendency to enter the market earlier. The general measures for skills and resources used in this research included a number of skills and resources. Different abilities may encourage a firm to enter earlier or later than firms with dissimilar characteristics. No data were collected to measure a firm's R&D capabilities or its marketing strength specifically[8]. If it had been possible to measure the skills and resources more precisely a more definitive result may have been possible.

Industry / Product Market Conditions:

CR1: The concentration ratio at the time the product enters the market affects its performance:

H2a: If the concentration is very high or very low, uncertainty is low and performance should be better.

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[8] If a firm is strong in R&D, one would expect early entry if a firm is strong in marketing skills, one would expect later entry.

H2b: If the concentration is at an intermediate level, performance should be poorer.

These hypotheses assume that a wide range of concentration levels could be tested and measured. In the word processing product market the concentration did not vary much from the first year of measure to the date of the performance measure. It, therefore, was not possible to test the nuances included in the two hypotheses generated at the outset of this research project.

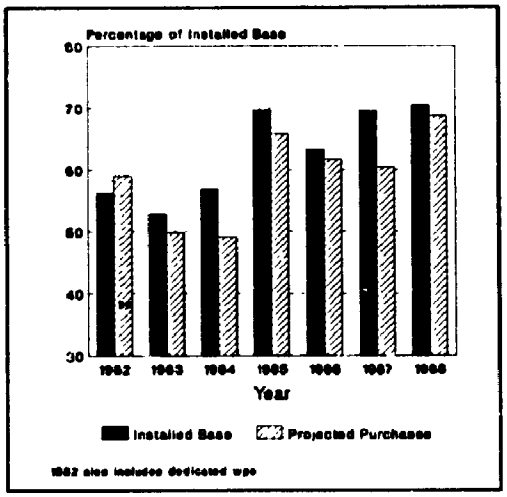

Figure 5.5 Yearly Concentration in the Word Processing Market

The range of the concentration construct ran from a low 49% (projected purchases) to a high of 70% (installed base). For this range there is a small positive relationship between the concentration levels and performance.

Lippit and Oliver (1986) classified concentration levels as high, medium or low based on the value. They used the following: low = ratios of less than 40%, medium = ratios of 40-59%, and high = ratios 60% or greater. They compared current concentration levels with performance, rather than entry concentration levels. But, if one were to use their same categorization, all the entries in the word processing product market entered with medium or high concentration levels. This likely explains the small positive relationship between concentration levels at entry and performance.[9]

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[9] An analysis was undertaken examining the factor scores for both the concentration and the performance constructs. A U-shaped relationship did not emerge. In fact, no overall relationship was discernable. This is no doubt due not only to the restricted range that the concentration values represent, but also to the limited number of values (one for each year only) of the concentration measures.

CR2/CR3/CR4: The concentration ratio could affect both when a firm enters and market and the amount that it invests in a market.

No directional relationship was hypothesized between the constructs. As Figure 5.4 indicates all three paths are significant. There is a positive path between concentration ratios and the timing of entry; thus, in general, the later the entry, the higher the concentration ratios. This makes sense as the concentration level has tended to increase over time (Figure 5.5) so that later entrants would have entered when the concentration level was higher.

There is a significant negative path between the concentration ratio and distribution investment. As there is limited retail shelf space and limited listing space with mail order firms, this is not surprising. When the concentration level is high, those firms with the high market share probably already have a place in these distribution channels. It would, therefore, be difficult for new entrants to gain access to either of these channels.

Finally, there is a small negative path coefficient between the concentration ratio and advertising investment. This says that the higher the concentration ratio at the time of entry, the smaller the relative entry advertising investment. It is unclear why this should be the case. Access to the advertising pages is not restricted, as is distribution space. It may just be that the firms with the high market shares are also advertising heavily during the new product's entry period. This may make the entrant's relative advertising investment appear small. The established products would likely have more money to invest in advertising at the time of entry.

NC1: The more active competitors there are in the market at the time of entry, the poorer the entrant's performance.

A small positive path coefficient was significant. Thus, this hypothesis was not supported. In other words, the small positive

effect means that the more competitors there are in the market, during the entry period, the better the performance. This unexpected result probably occurred for three reasons 1) the nature of advertising in this product market (Figure 5.2, highest advertising early, 1983) 2) the strong negative relationship between timing of entry and performance and 3) the high levels of competition may have helped spur demand in this growth market.

NC2: The more active competitors there are in the market, the later the market entry.

This hypothesis was predicated on the assumption that over time more competitors enter the market. This was especially true for the Data Sources measure which emulated the timing construct and was dropped from further analysis. Active competitors are now only measured by the advertisements in the entry period. There is a negative path between these two constructs which says the more active competitors there are, the earli . the entry. This result makes sense given the advertising behavior of the competitors. The number of active advertising competitors increased until 1983 and then dec:eased (Figure 5.2).

NC3/NC4: The more active competitors there are in the mark:t at the time of entry, the higher the amount invested in distribution and advertising.

Both paths are positive and significant. With more competitors already in the market at entry, the firm needs to invest more in advertising and distribution in order to make an impact on the market.

The large number of significant paths in the model and validated hypotheses supports a finding of nomological validity. The entry strategy performance model does a good job of explaining the relationships between entry strategy components, product market characteristics and performance.

These relationships are, for the most part, as hypothesized. These results tend to suggest that the entry strategy performance model provides a good framework for explaining entry strategy performance.

Evaluation of Overall Model

Sample Size. Before the overall model is discussed it is appropriate to examine the results in light of the sample size. With the results in hand, it is possible to see if there were sufficient cases for the partial least squares analysis. The 'sample' size appears to have been sufficient for the following reasons. First, using the formula described at the end of chapter four, the final model includes 21.84 data points per parameter. (This is double the recommended level of ten data inputs per parameter.) Next, most of the hypotheses were confirmed. Third, the estimation converged in only sixteen iterations. Also, the jackknifing estimates are stable and significant. (See the discussion in Chapter Three for an elaboration of why these reasons confirm an adequate sample size.) Finally, there is a substantial degree of predictive relevance as indicated by the Stone-Geisser test value of .58 and the R^2 of .818. (The predictive relevance measures are discussed later in this section.)

Overall Model Evaluation: Predictive Relevance. Unlike LISREL there is no statistic to provide an assessment of the overall fit of the model. This does not mean that there is no meaning in the overall model. One of the primary reasons for analysis via any structural equation modeling technique is to discover the relationships between the various parts of the model. PLS has allowed the examination and testing of many hypotheses (see last section) based on the paths in the model. These paths together make up the overall model. The large number of significant paths in the model (see Figure 5.5) implies that the overall model describes reality. But how good a model is it?

R-Square. In regression the explanatory value of the linear model is estimated by the R^2 for the equation. There is no overall R^2 for the

entire PLS model but there is an R^2 calculated for each of the endogenous constructs. The entry strategy performance model was developed with constructs which should impact long-run performance of the product. The R^2 for the endogenous construct Performance, therefore, gives us an indication of the ability of the model to explain or predict performance. The R^2 is .825. Evaluation of the magnitude of an R^2 in traditional regression is contingent on degrees of freedom, etc. These calculations are not readily available within the PLS analysis framework. All one can say is that it appears that the model does a good job of predicting performance.

Stone-Geisser's Test of Predictive Relevance. There is another way to assess the predictive ability of the PLS model. This can be done by doing generalized crossvalidation[10] and calculating a Stone-Geisser criterion test. The Stone-Geisser test is analogous to the R^2 criterion of predictive relevance for regression. "Stone-Geisser's criterion, briefly stated, is of type $R^2>0$, evaluated without loss of degrees of freedom." (Wold 1982, p. 31)

Two advantages of generalized crossvalidation make it suitable for use with soft modeling techniques such as PLS. First, it requires no distributional assumptions and no assumption of independent observations. Also, because the data point being reconstructed is estimated from a model developed without using that data point, there is no loss in degrees of freedom. This allows the researcher to examine the predictive relevance of a model with a large number of parameters relative to a small number of cases. As Wold (1982, p. 30) states: "the cross-validation test of Stone (1974) and Geisser (1974) fits soft modeling like hand in glove".

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[10] Generalized crossvalidation is a method for reconstructing observed values given a model and its parameters. The data are split repeatedly into an estimation set and a confirmation set. The ability of the model and its parameters to accurately 'predict' or estimate the observed values can be measured using a relevance measure of the form $Q^2 = 1 - E/O$. O is the sum of squares of the observed values and E is the sum of squares of the errors. (Lohmöller 1981)

Lohmöller (1981) includes a measure called "blindfolding redundancy". It is basically the test for predictive relevance that Wold (1982) recommends for use with partial least squares modeling, the Stone-Geisser test for predictive relevance. It is described as the proportion of variance that can be predicted by the predictors of its own latent variable. In it the latent variable is eliminated and replaced by the predictor(s).

The Stone-Geisser measure's interpretation is similar to that of the R^2, evaluated without loss of degrees of freedom. In Lohmöller's PLS manual he explains how to interpret the results of the Stone-Geisser test (Q^2).

> $Q^2 = 1$ indicates that the data can be reconstructed completely from the model; $Q^2 = 0$ shows that the model has no relevance for the data, and $Q^2 < 0$ that the non-blindfolded parts of the data matrix are misleading when guessing the blindfolded parts. (Lohmöller, 1981)

The Stone-Geisser test, therefore, provides a measure of predictive relevance of the established model. Wold (1985) applied the Stone-Geisser test tc a model he had tested. The resulting Stone-Geisser measure was .42. Wold said that this indicated "a substantial degree of predictive relevance." The Stone-Geisser test can be calculated for any endogenous construct of interest in a model. Once again, it is the prediction of performance that is of primary concern in this research. The Stone-Geisser test of predictive relevance for performance in the revised model is .58.

Discussion of Results

The word processing product market in the microcomputer industry proved to be an ideal market for study. The widely available data in the industry and its rapid development allowed the operationalization of the entry strategy performance model. The analysis discussed in this chapter showed that generally the entry strategy performance model does a good job of predicting long-term performance from the entry strategy. Virtually

all the paths were significant (Figure 5.4) and in the direction hypothesized. These findings, coupled with the preliminary findings of Ryans and Green (1990) in a simulated environment, provide strong support for the entry strategy performance model.

Although this product market is similar to many other product markets both within and outside the microcomputer software industry, the model was only tested in one product market. Although most results are consistent with expectations, the generalizability of the results is limited. With these thoughts in mind the analysis in this chapter is repeated in the next chapter in a different product market, the business graphics microcomputer software product market. This replication is undertaken to see if the entry strategy performance model is applicable to more than one product market and if the relationships between the constructs are the same across product markets.

CHAPTER SIX
ENTRY STRATEGY PERFORMANCE IN THE BUSINESS GRAPHICS PRODUCT MARKET

In this chapter a second test of the entry strategy performance model is undertaken with the business graphics category of software. Whereas word processing software is universally used by everyone with access to a computer, graphics software has more specialized uses. Graphics software is generally used to present data and information in more interest-catching and informative ways than simply tables of numbers. Managers quickly discovered that the output from a spreadsheet (usually *Lotus* 1-2-3) was functional, but not attention-getting. Others, with or without a spreadsheet, tried graphics packages to give their presentations more pizzazz. Often information is better conveyed, and better remembered, from graphical presentations than textual material (Alesandrini 1985). In addition, neatly printed textual materials are more pleasing than handwritten alternatives. Graphics packages fill these needs. The products are generally used by business managers and other professionals making written or oral presentations.

Sufficient software reviews and information are available to provide a second test of the entry strategy performance model within the graphics category of software. The constructs, operationalizations, data sources, and data analysis are the same for the business graphics software as they were for the business word processing software. The entire process and rationale are replicated.[1] In the next section the similarities and differences in the two product markets are discussed. Next, specific decisions, as they apply to the business graphics software market, are discussed. These include entry period, date for performance measure and a discussion of the different construct measures. Following this is a

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[1] The analysis, however begins with the research model developed for the microcomputer industry in the last chapter (Figure 5.3, replicated as Figure 6.2 in this chapter).

discussion of the test of the entry strategy performance model in the graphics product market.

Similarities and Differences in the Two Product Markets

Similarities Between the Graphics and the Word Processing Product Markets

The word processing and graphics product markets are each one of the five major categories of business software for microcomputers. Both types of applications were previously available on mainframe computers but were not widely adopted, even by those with access to mainframe computers. These, and many applications on the mainframes, were not user friendly. Microcomputers, even with the early limited packages, could produce better output in much less time than the mainframes. For a while users found that the flexibility of the microcomputer packages outweighed the poorer quality output. Over time, and with competition, users began demanding more and more from the output of the programs. As the markets developed there were many entrants into both product markets, resulting in a large number of competitors in both markets. Although both product markets had "features races", the products within the product markets reacted differently. In the word processing product market there seems to have been parallel development among the major packages. All started out with similar rudimentary features. With each new version products would have features that were new in their competitor's last product version. In the graphics market the products did not start similarly and only recently have begun to have similar features. Some were best for charts and numerical applications, such as *Graphwriter*. Others' strengths were drawing (*Freelance*) or ease of use (*Chart-Master* in the early years, then *Harvard Graphics* more recently). The different programs focused on their strengths. It was not until the market became more competitive (around 1986) that the programs began to develop more similarity.

Over the years the complexity of both types of packages has increased dramatically as developers have added features demanded by

consumers. Also, for both markets the early market share leaders (*WordStar* and *MultiMate* in word processing and *Chart-Master* and *Microsoft Chart* in graphics) were no longer popular by the maturation of the market.

Differences Between the Graphics and the Word Processing Product Markets

The two product markets developed at different speeds. The word processing product market was more competitive and matured more quickly than the graphics product market for several reasons. One key difference between the two is hardware needs. Word processing can, and has been, produced on almost any type of computer and any type of output device. Most screens can produce a textual display almost simultaneously with input. Speed of the program, until the programs became feature laden, did not pose a problem. Graphics programs, on the other hand, are different. Speed is needed. Users want to see how their inputs change the output. To get the necessary speed the graphics programs were generally written in assembly language. This increased programming difficulty and was hardware dependent. Over the years graphics displays have changed (Hercules, CGA, EGA, VGA, and now Super VGA). With these changes many different 'standards' have arisen. This complication has hindered the interchange of data between programs and between various hardware devices, and slowed the development of the graphics packages in the DOS environment.

Potential graphics users were not limited to only business graphics packages in the DOS environment. Competitors, outside the product market, did not have a parallel in the word processing product market. The first major competitors from outside the product market were the integrated packages such as the *Lotus 1-2-3*. When *Lotus 1-2-3* was first introduced it was marketed as an integrated package: spreadsheet and graphics combined. Many people used it as such. It was easy to produce graphical output and to make changes. "Prettier" output required the use of dedicated graphics packages, and in the early years, reentry of data with each change. The output, however, was often only marginally better

because of the limitations of the hardware (low resolution screens and other output devices, limited speed and memory on machines, etc.). In 1985, 28.5% of the market said they used *Lotus* products for graphics. The *Lotus* product they were referring to was *Lotus 1-2-3*. It had a higher market share than any stand-alone graphics product during that year.[2] It was not until 1986 that a graphics product dominated in the graphics product market.

Another alternative that slowed the development of this product market was the competition from the alternative operating system for microcomputers: Apple's products. For many, especially, those in graphics departments, the Apple or the Macintosh was synonymous with graphics. This alternative operating system used a graphical interface that made it easier and quicker to alter diagrams and drawings. The output devices were also clearly superior at first. Professionals dedicated to producing graphs and artwork proclaimed the superiority of this system for graphics. This may have slowed the acceptance of IBM-based graphics products but did not stop them because the business graphics products for the DOS market were targeted to business people, not the graphics departments. The cost of relearning a new operating system, coupled with the fact that everyone else in the office used an IBM-compatible machine slowed the impact of the Macintosh graphics on the DOS business graphics product market. The existence of sophisticated graphics on the Apples may have slowed the trial of graphics packages on DOS machines as they clearly could not be as good.

In the replication undertaken in this chapter all the original hypotheses from the entry strategy performance model are posited. The product markets' similarities and differences may help us understand the results, but they are not used to alter any of the hypotheses.

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[2] These data are from the Software Market Survey by Software Magazine.

Operationalization in the Business Graphics Product Market

Definition of Business Graphics Product Market and Selection of Cases

As with the word processing product market, the basic definitions come from the PC Magazine product reviews. The definition from the earliest comprehensive business graphics review (June 11, 1985) includes those products that allow users to input numbers and see a graph produced automatically. Eliminated from the sample were 'graphics' products that had 1) screen output only, 2) free-form drawing only, 3) sign making only, 4) CAD/CAM only, and 5) integration such as *1-2-3*, *Symphony*, *Framework*, and *Enable*. Business graphics programs are those programs that permit the semiautomatic generation of single charts following the input of data. They do not include presentation packages that allow the development of a slide show. Nor do they include the recent packages that allow the simultaneous development of speaker's notes with the charts. Both 'features' are recent developments for some high end graphics products.

As in word processing, it was important to include both successful and unsuccessful products all entering at different times. Again, PC Magazine product reviews enabled the measurement of the competitive positioning constructs. Comprehensive reviews occurred over several years allowing for capture of multiple entrants into the market and measures near the time of entry. Products included in the study were all those meeting the definition from the 1985 review, in each review article. The dates of the other reviews included in the study are: March 10, 1987, March 15, 1988, and September 27, 1988.

Multiple Product Entries from the Same Firm

In the business graphics product market five firms showed up with multiple entrants in the 'sample'. For three of the five it was reasonable to do as had been done in the word processing product market and consider the products as the same. (As in word processing the entry

information for the earliest product is used and performance information for both is included.)[3]

However, two companies did have two viable business graphics products on the market simultaneously. As the graphics products from both companies appealed to different niches and were both supported by their firms, both products from each company need to be included in the data set. The products are *Graphwriter* and *Freelance* from Graphics Communications (currently owned by Lotus Corporation) and *PFS:Graph* and *Harvard Graphics* from the Software Publishing Company. Separate measures for each product are readily available for all the measures except market share. This is because Software Magazine reports the data by company name. The market share was divided between the two products to take into account the proportion of sales each product provides its firm.

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[3] The companies where two products were counted as one are: Ashton-Tate, Business & Professional Software and Fox & Geller. Decision Resources first entered the graphics market with a product called *Chart-Master*. It meets the definition of our business graphics software perfectly. It was, in fact, the best seller for a time. The company later came out with compatible products: *Sign-Master* and *Diagram-Master*. As the competition heated up many graphics packages began offering the features of all three of their packages in one, for much less money. They began bundling the packages together. Ashton-Tate later acquired Decision Resources. They continued to sell the *Master Series*. Then, in 1988, they came out with another graphics package *Draw Applause*, later *Applause*. For a short time they kept both software packages on the market. They eventually took the *Master Series* off the market and only sold *Applause*. Given this history the company supported only one graphics package at a time. They are considered, therefore, to have only one product entry.

Business & Professional Software first entered the business graphics product market in 1983 with a product called *BPS Business Graphics*. After they developed *35mm Express* and upgraded it to a full business graphics package they discontinued sale and support of *BPS Business Graphics*. Business & Professional Software, therefore, only had one business graphics product.

Fox & Geller first entered the graphics market in March 1983 with a rudimentary graphics product called Grafox. Later the company refined the program and developed it for specific applications with the dBASE (dgraph) or the r:BASE (rgraph) database programs. As the 'new' products are simply specialized versions of the original, all are considered one product. Entry information for Grafox is used and performance data for all products are used.

Date for the Performance Measure

Before their introduction, the graphics packages had been continually evolving over the years 1) to take advantage of the available hardware (computers, monitors, and output devices), 2) to become more user friendly, and 3) to allow user customization while balancing ease of use and aesthetic qualities. All this was done for most of the programs while they continued to concentrate on the production of single image output. The appropriate date for the performance measure for graphics is, therefore, just before the introduction of these complex, and for many, unnecessary features.

> Satisfaction is fleeting, especially in the PC graphics industry. A year ago (September 27, 1988) we looked at presentation graphics software and were satisfied with packages that let anyone with a modicum of skill create an aesthetically pleasing chart. One year later we want more. Being able to create a single respectable image is terrific if you're into limited-edition prints, but anyone who goes to battle with an audience knows that one fancy slide does not a presentation make. The key to success is a well-organized, consistent, and image-laden presentation. (Raskin 1989, p. 95)

> The software's emphasis is shifting from letting you create one image to helping you prepare an entire, cohesive-looking presentation *and* the speakers' notes and handouts to go with it. (Raskin 1989, p. 96)

Based on these quotes and the previous discussion the appropriate time for the measurement of performance in the graphics industry is the end of 1988.

Entry Period Determination

Again the appropriate entry period is six months, but, with the graphics software product market, measures were taken at six months for the citations and reviews and at twelve months for the advertisements. This decision was based on empirical reasons. It should be noted from Figure 6.1 that both citations and reviews and the advertisements had two peak periods after entry. For citations and reviews the second peak was

in period six. For advertisements the second peak was near the end of the second half of the year.

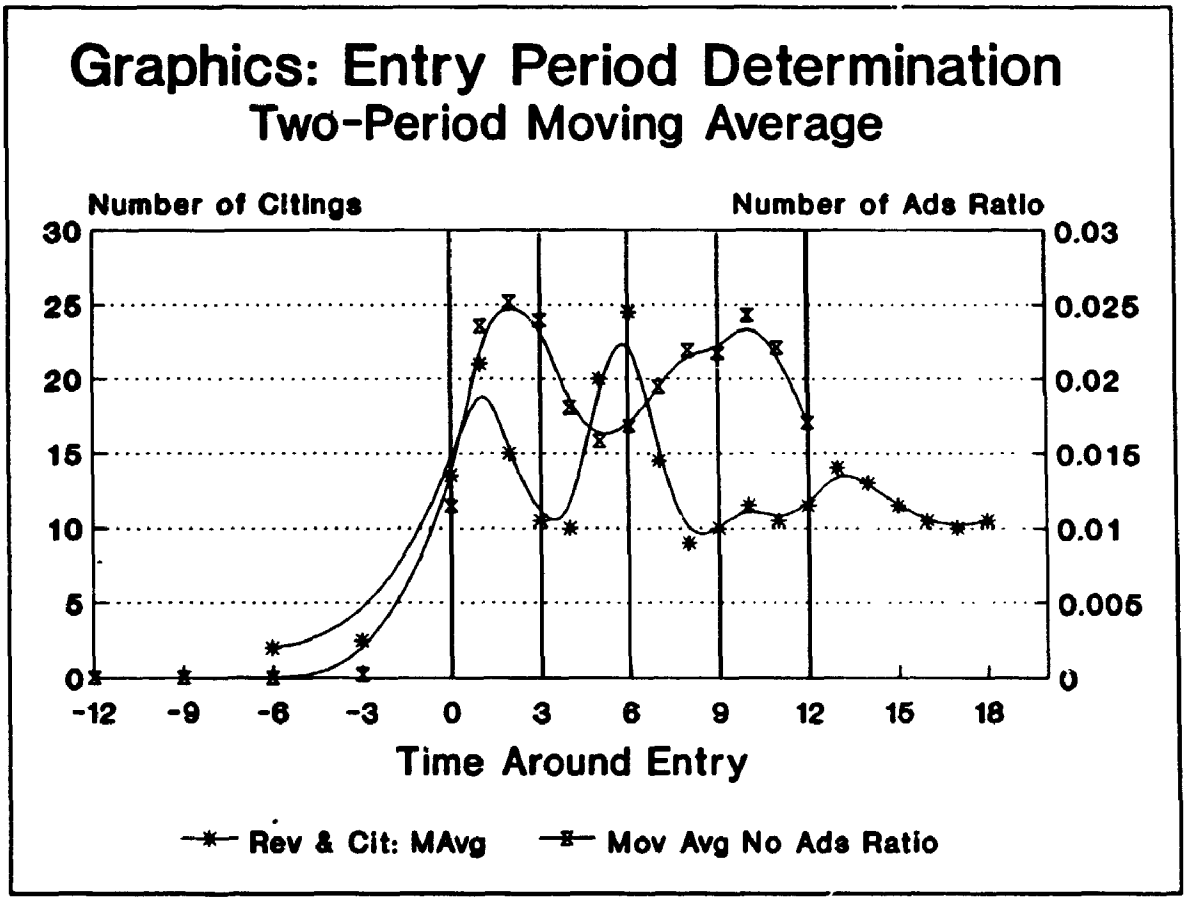

Figure 6.1 Graphics: Entry Period Determination

Data/Sources for Each Construct and Its Measures

Figure 6.2 shows the entry strategy performance model. It is the resulting structural model developed in the word processing product market (Figures 5.3 and 5.4). (It is the original research model, Figure 4.4, with prior entry experience collapsed into sources of advantage and the four competitive positioning constructs for quality collapsed into one.) Most of the measures were developed exactly as they were for the word processing product market. Each construct and its measures are briefly discussed.

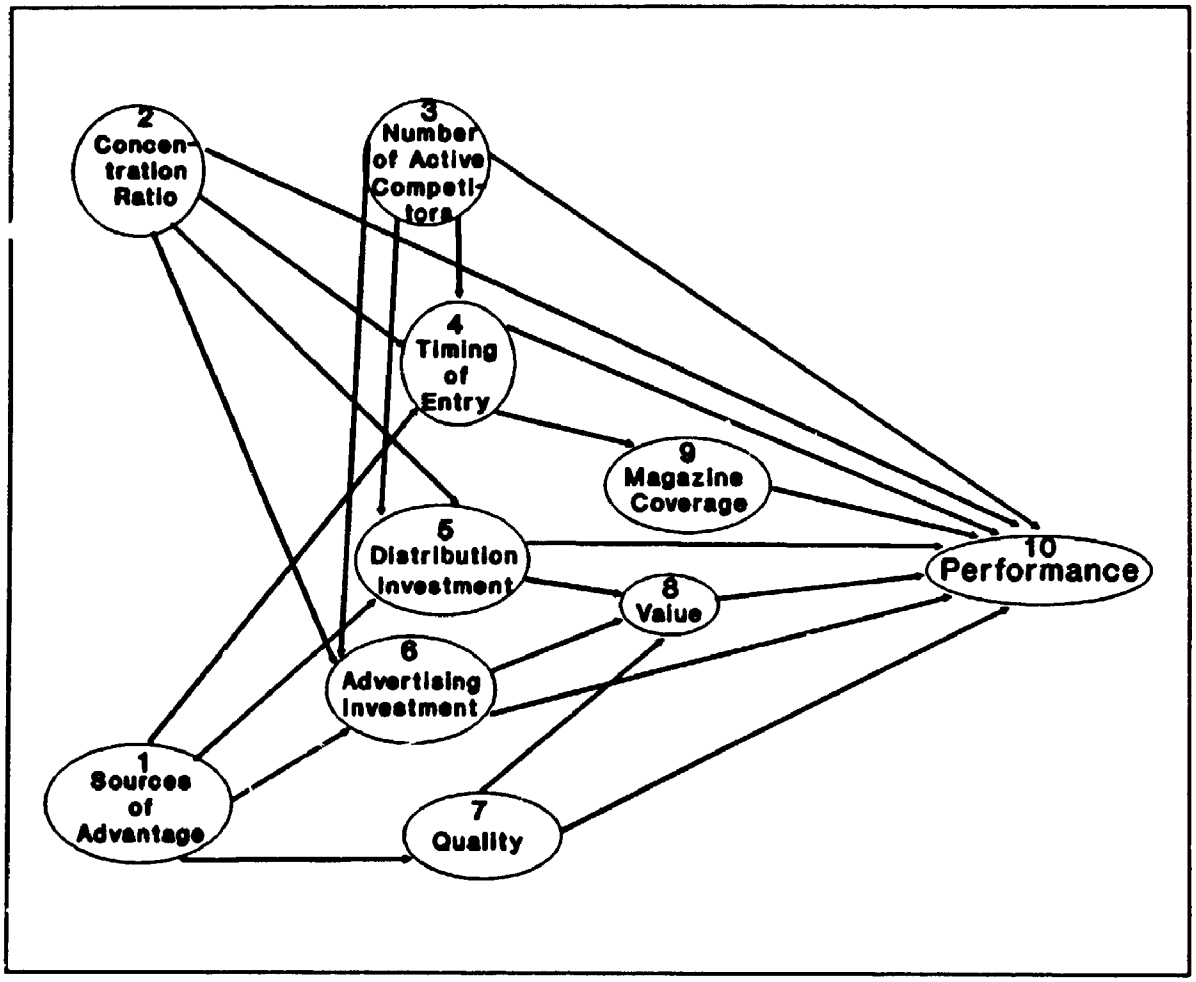

Figure 6.2 Entry Strategy Performance Model in the Microcomputer Software Industry

Performance. In the word processing product market seven measures were available. There are six measures of performance for the graphics software. Again, Software Magazir' 's annual survey of software professionals was used to establish the installed base market share (long-term market performance) and the next year's expected purchases' market share for each company (currently popular programs).

Next, for each program is the number of times a program was cited during the performance year. The more popular a program, the more often it will be discussed. As before, two sources are used. Business citations are measured from the ABI/Inform database while microcomputer-related citations are captured from the Microcomputer Index.

Finally, as with word processing, PC Magazine, did a survey on the use of business graphics during the performance year. The survey was reported in the September 27, 1988 issue of PC Magazine (Achieving the Proper Image). The poll, like the word processing survey, was taken via electronic mail. There were 1267 respondents to the survey on the *PC Magnet* and the *Reader Interactive Service* between May 6 and May 18, 1988. Two questions were used for performance measures: 1) Which graphics software package is most often used in your company? and 2) Which business presentation graphics software program is your company considering purchasing in the next 12 months? The responses to both questions were reported as a percentage. This percentage was recorded as the performance measure. If a product was not listed, it was given a zero performance rating for these measures.

Competitive Positioning: Pricing. The same three measures that were suggested for word processing were used here: discounted price, relative retail price and relative low price. Naturally, the comparison retail price for the graphics software was calculated based on the leading graphics program's prices, not the word processing programs' prices.

In word processing the price of the top selling package during each review was $495. This was at the high end of the price range and was generally the modal price charged for the product. For graphics the price of the top selling package was, again, at the high end of the price range. Yet, in only one of the four reviews was the reference price also the modal price. During the time of each review there was a clear best seller. The price of the best selling product at the time of each review is, therefore, used as the reference price in deriving the relative retail price measure.

Competitive Positioning: Quality, etc.. The data for the graphics software product market were also coded to capture all four quality dimensions. Since this replication was to test the efficacy of the entry strategy performance model developed both theoretically and empirically in

this dissertation, the graphics market is tested against the structural model developed in the word processing product market (Figure 6.2). Therefore, all the quality constructs were collapsed into one features measure.

The actual measures for each construct have the same definition as in word processing, with only one exception. The hardware support measure for compatibility with word processors included only the number of printers supported. For the graphics software it also includes other output devices, where the information was available. Depending on the review, this included graphics adapters, dot matrix printers, ink jet printers, laser printers, thermal printers, plotters, slide makers or film recorders. This expanded definition was used because the reason for using a graphics package is to provide superior support. The better the hardware, the better the likely results.

Timing. The measures used are the same as those used in word processing (Figure 4.8). The 'number of entrants' measure was calculated exactly as it was for the word processing category of software. The other measure, 'months after first entrant' was calculated in the same manner as for word processing. Here no definitive source could be found dating the first graphics program for the DOS market. It was, therefore, decided that the date for the first graphics entrant would be the earliest one in the databases developed for this dissertation.

The earliest graphics package, covered in the reviews, to enter the graphics market was *Chart-Master*. However, the advertising data base shows an earlier entrant. The first graphics advertisement was for *Chartman* in August 1982. For all graphics products in this study the measure 'months after first entrant' is, therefore, the months since August 1982.

Sources of Advantage. The 'human capital' and 'capital base' measures used for word processing were developed similarly for the graphics product market. In addition, the prior entry experience

construct was collapsed into the sources of advantage construct, as had been suggested by the word processing analysis.

Originally, two measures had been suggested for prior entry experience: 1) 'years in business' and 2) 'similar software entries'. The first of these two measures has also been collected for the graphics product market. The second measure was dropped for two reasons: 1) there was less information available for the graphics market resulting in missing data for about one half the cases, and 2) the measure, even with the superior word processing data, was not statistically reliable and was dropped from the analysis. With even poorer information available for graphics it was prudent to drop the measure.

Magnitude of Investment: Advertising. The six measures for this construct (Figure 4.12) were calculated exactly as they were for the word processing data with the one exception discussed under entry period. The advertising data were examined for a twelve-month, not six-month, period following entry.

Magnitude of Investment: Distribution. The distribution magnitude of investment for the graphics software was identified via the same four measures that had been made for the word processing software (Figure 4.13). Since there were no shareware programs in the graphics data set all products had the same value on the 'share' measure. It was, therefore, dropped from the analysis.

Product Market Characteristics: Number of Competitors. The number of competitors at the time of entry has two measurements: competitors advertising during the entry period and the number of competitors listed in Data Sources during the entry period. These were calculated as they were for word processing (Figure 4.14).

Product Market Characteristics: Concentration Ratio. The concentration ratio at the time of entry is captured via two measures. These were collected and measured as discussed in the word processing product market (Figure 4.15).

Magazine Coverage. This construct was measured using the same five measures developed for the word processing product market (Figure 4.16) with one exception. The data in the measure were used only for the first six months following entry. This decision was based on the empirical analysis discussed in the 'entry period' section discussed earlier in this chapter.

Data Analysis and Discussion of Results

Measurement Model Evaluation: Preliminary Measurement Model

As noted in Chapter Five the first step in the analysis is an evaluation of the measurement model. Construct measures are generally all considered acceptable if the composite reliability is greater than .60 and the average variance extracted is greater than .50. Table 6.1 summarizes the measurement model. The measures for most of the constructs are acceptable (Sources of Advantage, Concentration Ratios, Timing of Entry, Advertising Investment, Quality, and Performance) and need not be discussed. These measures will all be retained in the final model.

Number of Active Competitors. The results here are similar in magnitude and degree to those found in the word processing product market. The composite reliability is low because the factor loadings are high, with opposite signs. In the word processing product market it was decided that the number of competitors measured from Data Sources measures the passage of time and not the number of competitors. It was, therefore, dropped from further analysis. The same is done here. (See Chapter Five for a more complete discussion.)

Distribution Investment. Although none of the loadings are small for this construct, the direct sales measure has an opposite sign for both the loading and the latent weights. Because of this the composite reliability for the construct is under .60 even though the average variance extracted is well within the acceptable range. In the word processing analysis the direct measure was dropped because it was realized

Table 6.1 Graphics Measurement Model (Comparable to Table 5.1 for the Word Processing Product Market)

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
1 Sources of Advantage			.966*	.906
General Entry Experience	.284	.883	.780	
Employees	.380	.984	.968	
Dollar Sales**	.381	.985	.970	
2 Concentration Ratio			.889*	.802
Installed Base	.375	.829	.688	
Projected Purchases	.720	.957	.915	
3 Number of Competitors			.062*	.728
Advertising Data	-.383	-.754	.568	
Data Sources	.754	.943	.888	
4 Timing of Entry			.884*	.792
Months	6.842	.906	.820	
Competitors	-5.951	.873	.763	
5 Distribution Investment			.465*	.707
Direct Sales	-.286	-.825	.680	
Retail Sales	.298	.835	.697	
Mail order Sales	.597	.863	.745	
6 Advertising Investment			.871*	.550
PC Magazine Ad Volume	.245	.897	.804	
PC Magazine No. of Ads	.297	.913	.834	
PC World Ad Vol.	.244	.825	.681	
PC World No. of Ads	.258	.788	.622	
Byte Ad Volume	.127	.447	.200	
Byte No. of Ads	.116	.397	.158	
7 Quality			.785*	.652
Editor's Choice	.786	.923	.852	
Features	.409	.671	.451	
8 Pricing			.400*	.354
Relative MSRP	-.002	-.102	.010	
Discounted Price	.983	.997	.993	
Relative Mail order Price	-.082	.241	.058	
9 Magazine Coverage			.697*	.394
Very Favorable	.155	.563	.317	
Reviews Favorable Reviews	.521	.864	.747	
Mixed Reviews	.111	.428	.183	
Unfavorable Reviews	.045	-.063	.004	
All Other Citations	.492	.848	.718	

Table 6.1 (continued) Graphics Measurement Model

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
10 Performance			.970*	.844
ABI/Inform Citations	.141	.692	.479	
Microcomputer Index Citations	.192	.928	.861	
Expected Market Share: Software Magazine	.186	.959	.921	
Installed Base MS: Software Magazine	.183	.970	.942	
Personal Use WP: PC Mag survey	.192	.978	.957	
If Change WP--to What? PC Mag survey	.190	.953	.908	

R-Square on Performance = .807

*This value is the composite reliability of the construct, or its internal consistency.

**The factor loadings for sources of advantage may be a little high since nine of the dollar sales vales were estimated from the number of employees.

Note: the latent weights are bolded where the indicators are formative, the loadings are bolded where the indicators are reflective.

that this measure could represent a wide range of investment strategies--from small to extensive investment. Since the same is done within the graphics market, the same reasoning also applies here. Also, therefore, if a firm sold retail they usually also did not sell direct; the two measures (direct and retail) may be measuring the same thing--but with different signs.

Pricing. As in the word processing product market the relative mail order price is a poor measure. For the same reasons it will be dropped from further analysis.

Of interest here is the low loading and low latent weight for the relative manufacturer's suggested retail price measure. This is not what was found in the word processing product market. There it was lower, but not nearly so small. The most likely explanation is that in the word

processing market the market leader was highly visible. The leading product was frequently discussed in the reviews of other products. The graphics product market never showed the same level of competition that was evidenced in the word processing market. Although generally a package could be identified as the best selling package, there did not seem to be any agreement that it was the 'best' package on the market. Comparisons with the leading seller do not appear to have been made as often. Therefore, this may be the reason that the price comparison with the most popular selling package does not load highly on this construct.

Magazine Coverage. As with the word processing product market the mixed and unfavorable product reviews have low loadings. Again, it is likely that the favorable reviews improve a product's performance and mixed or unfavorable reviews have little or no effect. These two measures will be dropped from further analysis.

Measurement Model Evaluation: Reliability and Validity

Table 6.2 summarizes the revised measurement model for the graphics product market. The composite reliabilities range from .770 to 1.00. These are well above the .60 suggested guideline. The average variance extracted for the constructs in the model range from .550 to 1.00. The measures are, therefore, reliable, and assessment of the validity measures can proceed.

Generally the R^2 between the constructs is lower than the average variance extracted for the constructs. In the few exceptions, at least one of the constructs had an AVE higher than the R^2 between the constructs. As the variance shared between the constructs is less than the variance shared between the constructs and their measures, discriminant validity is supported.

Examination of the loading structure matrix shows that for 27 of the 28 constructs the measure loaded highest on the construct to which it had

Table 6.2 Revised Graphics Measurement Model

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
1 Sources of Advantage			.966*	.905
General Entry Experience	.268	.878	.771	
Employeer	.387	.986	.972	
Dollar Sales**	.388	.987	.973	
2 Concentration Ratios			.893*	.807
Installed Base	.408	.844	.713	
Projected Purchases	.691	.949	.900	
3 Number of Competitors			1.000**	1.000**
Advertising Data	1.00**	1.00**	1.00**	
4 Timing of Entry			.770*	.627
Months	8.972	.813	.661	
Competitors	-8.180	.769	.592	
5 Distribution Investment			.827*	.710
Retail Sales	.362	.722	.522	
Mail order Sales	.780	.947	.897	
6 Advertising Investment			.870*	.550
PC Magazine Ad Volume	.242	.896	.802	
PC Magazine No. of Ads	.302	.914	.836	
PC World Ad Vol.	.242	.827	.684	
PC World No. of Ads	.262	.792	.627	
Byte Ad Volume	.123	.441	.194	
Byte No. of Ads	.114	.392	.154	
7 Quality			.784*	.651
Editor's Choice	.787	.923	.852	
Features	.407	.670	.450	
8 Pricing			1.000**	1.000**
Discounted Price	1.00**	1.00**	1.00**	
9 Magazine Coverage			.817*	.604
Very Favorable Reviews	.220	.587	.345	
Unfavorable Reviews	.489	.852	.725	
All Other Citations	.527	.862	.743	

Table 6.2 (continued) Revised Graphics Measurement Model

Construct/ Measures	Weights	Standardized Factor Loadings	Reliabilities	Portion of Variance Extracted
10 Performance			.970*	.844
ABI/Inform Citations	.143	.693	.481	
Microcomputer Index Citations	.191	.928	.860	
Expected Market Share: Software Magazine	.185	.959	.920	
Installed Base MS: Software Magazine	.184	.970	.941	
Personal Use WP: PC Mag survey	.192	.978	.957	
If Change WP--to What? PC Mag survey	.188	.952	.907	

R-Square on Performance = .815

*This value is the composite reliability of the construct, or its internal consistency.

**1.00 is by definition as only one measure was included for this construct.

Note: the latent weights are bolded where the indicators are formative, the loadings are bolded where the indicators are reflective.

been assigned[4]. This provides support for convergent and discriminant validity.

Given the above results it can be concluded that the revised measurement model is composed of valid, reliable measures. Examination of the structural model may now proceed.

[4] The only exception was for the performance measure for the ABI/Inform citations. It loaded .694 on performance and .733 on magazine coverage. Since these values are very similar, there is no reason to discard this performance measure. A reason this measure loaded high on the magazine coverage construct also is that the ABI/Inform measure and the magazine coverage measures are both measures of citations, with different time frames (entry versus performance). The loading could be picking up a measurement similarity.

Table 6.3 Results of PLS Modeling: Revised Graphics Model

Antecedent Construct	Standardized Path Coefficient (Direct Effects)	t-value	Indirect Effects	Total Effect	Correlation
1. Sources of Advantage	0	----	.001	.001	-.045
2. Concentration Ratios	-.011	-1.9	.021	.010	-.007
3. Number of Competitors	-.096	-28.3	-.026	-.122	-.104
4. Timing of Entry	-.282	-44.5	.354	.072	.097
5. Distribution Investment	-.124	-9.6	.131	.007	.327
6. Advertising Investment	-.032	-18.2	.004	-.028	.457
7. Quality	.252	48.5	.033	.285	.652
8. Value	.175	53.9	---	.175	.429
9. Magazine Coverage	.800	2.8	---	.800	.810

The R-Squared with Performance as the dependent construct .815.

Structural Model Evaluation

Table 6.3 summarizes the results of the PLS analysis between performance and the other latent variables. All but one of the paths into performance are significant. The path coefficients and t-values (from jackknifing) for all the hypotheses in the model are shown on Figure 6.3. Each hypothesis proposed in Chapter Four is discussed in detail in the next section. Any differences in findings between the graphics product market and the word processing product market are noted.

Timing:

Both timing hypotheses are discussed together here as they are interrelated.

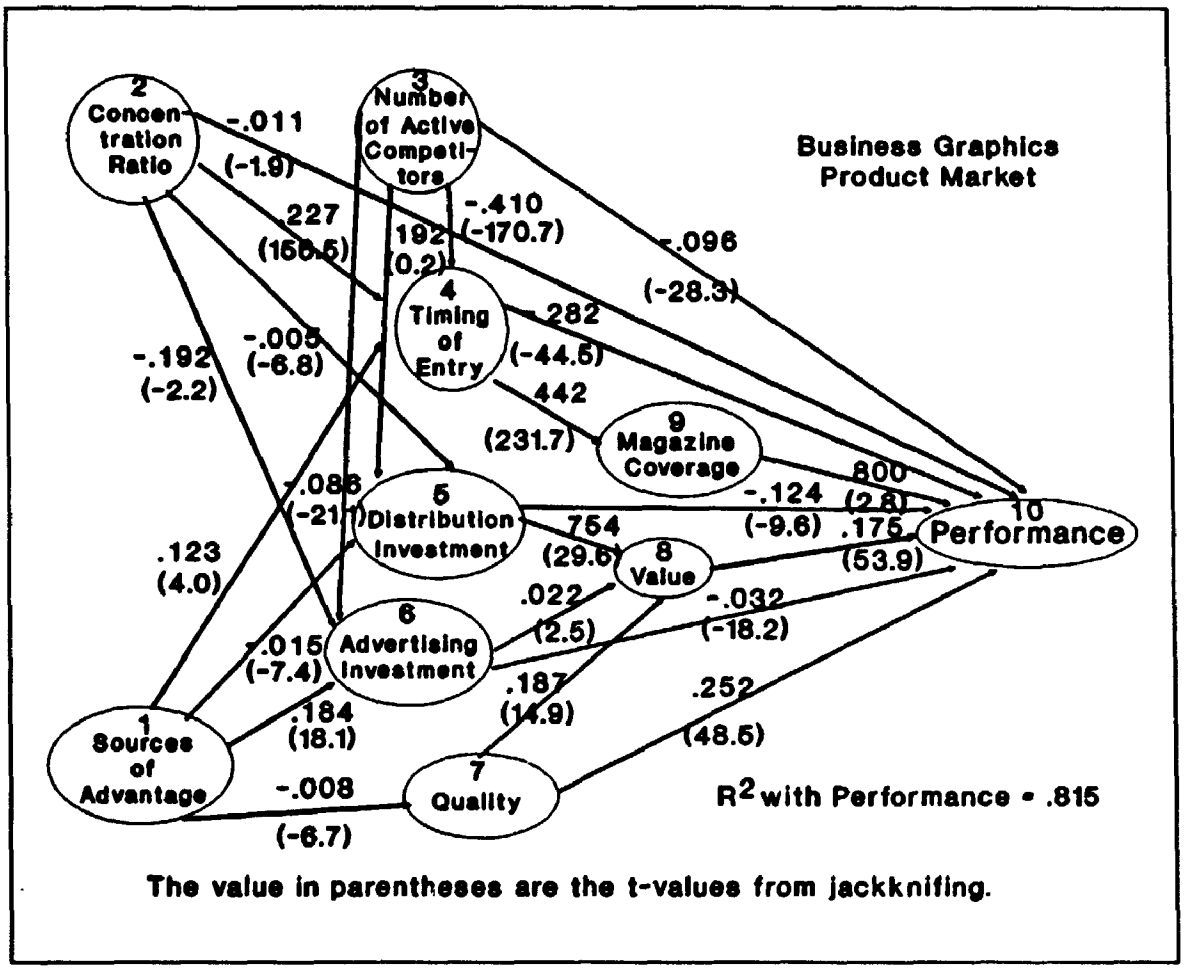

Figure 6.3 The Structural Model: Path Coefficients and t-values for the Graphics Product Market.

T1: The earlier the entry, the better the performance.

T2: The earlier the entry, the greater the magazine coverage.

The direct path between entry and performance is significant and negative. This supports the stated hypothesis. The total effects are small but positive. The total results, therefore, do not support the hypothesis. This is exactly opposite to the results in the word processing product market. There was a small positive direct path between timing and performance but the indirect effects through the 'magazine coverage' construct made the total effect negative. These results are traceable to the timing effects. As in word processing, there is a high positive relationship between

'magazine coverage' and performance. In the graphics market there is a strong positive path between 'timing of entry' and 'magazine coverage'. (It was negative for the word processing product market.) These results lead to the conclusion that later entrants into the graphics market did not have the difficulty receiving the magazine coverage that the entrants in the word processing market seemed to experience. In fact, it may have been easier for later entrants to get coverage, given the size of the path coefficient, than it was for the early entrants. This, therefore, eliminated any benefits early entrants would have received simply by virtue of being in the market early resulting in the low positive total effects and correlation. This difference is likely due to the different development of the two markets. The graphics market was much slower to develop, was less competitive, was more dependent on hardware, and was less important to most personal computer users.

Magnitude of Investment:

AI1: The larger the advertising investment, the higher the performance.

The small, but significant, path coefficient and total effects show a negative relationship between advertising investment and performance. That is, the larger the relative advertising investment, the worse the relative performance. This is opposite to the findings in the word processing product market.[5]

DI1: The larger the distribution investment, the higher the performance.

Although the measures in the graphics product market are the same dichotomous measures used in the word processing product market, here the results are a bit more consistent. Both the total effects and the correlation support the stated hypothesis. Higher

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[5] In the word processing product market a larger investment in advertising was associated with better performance for all three strength measures: the direct effects, the indirect effects, and the correlation between the advertising investment and performance. There it was concluded that the higher a firm's advertising investment, relative to its competitors, the better its performance.

investment in distribution, even measured this roughly, seems to result in better product performance. Given the nature of the measures the results indicate that products available for sale in retail stores sell better that those than are only sold directly by the firm.

AI2/DI2: A firm that invests more in distribution and advertising is likely to have a higher priced product.

Of the three proposed measures for pricing only one has been retained in the revised model. This measure is the ratio of the manufacturer's suggested price for the product and the lowest price at which the product was sold (the mail order price). The greater the discount price offered by mail, the larger the value on this measure and construct. A higher value on this construct does not necessarily denote a higher price. It simply indicates that the product can be obtained at a lower price via mail order. Therefore, the hypothesis, as originally stated above, cannot be directly tested in this model. Nevertheless, an examination of the path between the two constructs is warranted.

There is a significant positive path between both distribution investment and value and advertising investment and value. Given the actual measures used, one would expect a high path between distribution investment and value because of the way in which the constructs were measured. Both include the mail order option. When it is present in one of the constructs it should also be present in the other. (Value is measured only with the discounted price (based on mail order) while 'distribution investment' has two dichotomous measures for retail and mail order sales.) Because similar information is contained in both constructs it is not possible to definitively say that a higher investment in distribution leads to a higher value product. The result simply reflects the fact that

firms who use the mail order channel for selling their products are also willing to discount the prices of their products.

On the other hand, there is no expected relationship between 'advertising investment' and 'value' due to similar measures. The measures are independent. There is a positive relationship between the two constructs. This means that firms that advertised more heavily also sold their products at discounted prices through mail order firms. These two combined actions would make the product more visible and available at a reasonable cost to many prospective buyers. This could explain why the correlations between performance and the two constructs, 'advertising investment' and 'value', are high (above .40, Table 6.3).

Competitive Positioning:

Better competitive positioning gives the customer better value and this results in better performance. This general hypothesis was divided into two hypotheses about the two major components of value: quality (Q1) and value (V1).

Q1: The higher the relative quality of the product at entry, the better the performance of a product.

This hypothesis was strongly supported in the model with high path coefficients (and a high correlation) between quality and performance.

Q2: Higher quality products have higher prices.

A significant positive path between quality and value support this hypothesis.

P1: Higher prices reflect higher quality and should result in better performance.

As in the word processing product market the 'relative price' construct, as a whole, is measuring customer value through discounts from the manufacturer's suggested retail price. It does not measure relative pricing, per se, but relative customer value. The

following hypothesis is, therefore, a more appropriate interpretation of the path in the model between relative value and performance.

V1: Higher relative product value at entry leads to better performance.

This hypothesis is strongly supported in this model. The path is significant and the correlation between the constructs is .429.

Company Characteristics / Sources of Advantage[6]:

The three measured sources of advantage, general entry experience, human capital and capital base, all load highly (Table 6.1) on 'sources of advantage'.

SA0: A greater resource base will lead to better performance.

In the model it was not hypothesized that sources of advantage would have a direct effect on performance. They could still affect performance indirectly through quality, advertising investment, distribution investment, and timing. Table 6.3 shows that the total effect between sources of advantage and performance is .001, while the correlation between these constructs is -.045. Both are small results and have opposite signs. Given these data and this model it is not possible to support or reject the above hypothesis. The

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[6] The results reported for both the word processing and the business graphics market use the raw data as the measures for employee skills (number of employees) and available resources (dollar sales). As there is at least one outlier in each data set it was thought that using the logged value of these measures might provide 'better results'. The partial least squares analysis was repeated using the logged version of these variables for each product market. There were few differences between the logged and raw measures, but where there were differences, there was no consistent pattern either within or between the product markets. An examination was, therefore, made of the linear relationship between these two measures and each of the measures of the constructs postulated to be affected by Sources of Advantage. Neither method of measuring the Sources of Advantage resulted in more linear relationships. The raw measures were, therefore, retained in the model because of this, and, because to use the logged measures would mean dropping all the firms from the data set which were established simultaneously with the entry included in this study. As new start-up firms are important it was felt they should not be excluded from this study of entry strategies.

small magnitude of the results, however, make it appear that in this product market the hypothesis could not be supported.

SA1: Larger sources of advantage will result in higher quality products.

A significant negative path suggests that the opposite is supported in this product market. This same finding was present in the word processing product market.

SA2: The greater a firm's sources of advantage at the time of entry, the greater the investment expected in both distribution and advertising.

The relationship between sources of advantage and the two investment constructs provides a test of this hypothesis. Both paths are significant (-.015 with distribution and .184 with advertising). The paths between the two types of investment and 'sources of advantage' have the opposite signs in the graphics market from the findings in the word processing market.

In the graphics product market firms with greater 'sources of advantage' invested more heavily in advertising. In this market the 'advertising investment' construct was also more highly correlated with performance than in the word processing market (.457 versus .284). One possible reason for these results is that the graphics market was less well defined and the nature of the products varied more than in word processing. This may have made it more important to advertise, so that the consumer could understand what the product was offering. Also possibly, firms that could afford to do this advertising were the ones that did so.

The smaller, negative path, between 'sources of advantage' and 'distribution investment', is not as easy to explain. Also, because of the nature of the measure of the 'distribution investment', the results are not as solid. A possible explanation, given the nature of the measurements, is that larger firms did not want to discount

their products through mail order channels and, therefore, did not as readily invest in them.

SA3: The greater the skills and resources of a firm, the later the likely entry.

There is a significant positive path between these two constructs and a positive correlation between these latents (.153). These results support this hypothesis.

Industry / Product Market Conditions:

CR1: The concentration ratio at the time the product enters the market affects its performance:

H2a: If the concentration is very high or very low, uncertainty is low and performance should be better.

H2b: If the concentration is at an intermediate level, performance should be poorer.

These hypotheses assume that a wide range of concentration levels could be tested and measured. In the graphics product market the concentration did not vary much from the first year of measure to the date of the performance measure. It, therefore, was not possible to test the nuances included in the two hypotheses generated at the outset of this research project. (For the installed base measures 43 of the 44 observations were medium or high levels of concentration, while 70% of the projected concentration levels were high or medium levels of concentration.[7])

In the graphics market there is a small, non-significant, negative path between concentration and performance. This is in contrast to the small positive relationship between concentration levels at entry and performance in the word processing product market. No firm conclusions can be reached about these hypotheses from these two product markets.

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[7] As in the word processing product market, the factor scores for performance and concentration were graphed. Again, no relationship was found between the two constructs.

CR2/CR3/CR4: The concentration ratio could affect both when a firm enters a market and the amount that it invests in a market.

No directional relationship was hypothesized between the constructs in the original model. The same directional relationships that were found in the word processing product market were also found in the graphics product market. There is a significant positive path between concentration ratios and the timing of entry. There is a significant negative path between the concentration ratio and distribution investment. Finally, there is a small negative path coefficient between concentration and advertising investment. The correlations between each of these latent constructs also support the path findings. The same reasoning that applied to the word processing product market also applies here.

MC1: The more active competitors in the market at the time of entry the poorer the entrant's performance.

The significant negative path coefficient between the latent constructs support this hypothesis. This is opposite to the findings in the word processing market, but is consistent within its product market. As in word processing the results from this path are consistent with the total effects from timing of entry.

The graphics advertisements showed a similar pattern (but smaller magnitude) to the word processing advertisements across time (Figure 5.2). Therefore, early entry meant a larger number of competitors. Here early entry was associated with poorer overall performance (large positive total effects, Table 6.3). The findings here are, therefore, consistent with the overall timing effects.

MC2: The more active competitors there are in the market, the later the market entry.

As in the word processing product market this hypothesis was not supported by the data.

NC3/NC4: The more active competitors there are in the market at the time of entry, the higher the amount invested in distribution and advertising.

There is a small non-significant positive path between number of competitors and distribution investment, but a significant negative path between number of competitors and advertising investment. This is in contrast to a positive relationship for both paths in the word processing product market. Again, the 'advertising investment' relationship with the other constructs in the model differs from that in the word processing product market. The entrants in the graphics market pursued advertising differently than was done in word processing. This led to the different findings for the various paths.

Summary. The large number of significant paths in the model and validated hypotheses supports a finding of nomological validity. The entry strategy performance model does a good job of explaining the relationships between entry strategy components, product-market characteristics and performance. These relationships are, for the most part, as hypothesized.

Evaluation of Overall Model

The large number of significant paths in the model (see Figure 6.3) implies that the overall model describes reality. But how good a model is it?

R-Square. The R^2 for the endogenous construct Performance, therefore, gives us an indication of the ability of the model to explain or predict performance. The R^2 is .815. Evaluation of the magnitude of a R^2 in traditional regression is contingent on degrees of freedom, etc. These calculations are not readily available within the PLS analysis

framework. All one can say is that it appears that the model does a good job of predicting performance.

Stone-Geisser's Test of Predictive Relevance. The Stone-Geisser test provides a measure of predictive relevance of the established model. Its interpretation is similar to the R^2, evaluated without loss of degrees of freedom. (See the word processing discussion for more details about this test.) The Stone-Geisser test of predictive relevance for performance in the revised graphics model is .53. This shows that the model does a good job of predicting the value of the performance construct.

Discussion of Results

Sample Size

The 'sample' size appears to have been sufficient for the following reasons. First, using the formula described at the end of chapter three, the original model includes 26.7 data points per parameter, while the revised measurement model includes 24.6 data points per parameter. (This is double the recommended level of ten data inputs per parameter.) Second, most of the hypotheses were confirmed. Third, there is a substantial degree of predictive relevance as suggested by the Stone-Geisser test value of .53. The estimation converged in only twelve iterations. Finally, the jackknifing estimates are stable and significant.

Substantive Results

There is a substantial degree of predictability for the performance construct. This, coupled with the large number of significant paths, provides strong empirical support for the entry strategy performance model.

The relationships between some constructs in the model differed between the graphics product market and the word processing product market. These were noted in the discussion of the results and are

summarized in the next chapter (see especially Figure 7.1). This does not mean the entry strategy performance model does not do a good job of explaining entry success. It clearly did a good job in both product markets. It does show the robustness of the model and its applicability across product markets. Differences in the importance of the constructs in the model across product markets are likely, given that product markets may differ significantly. There are some differences between the business graphics software product market and the business word processing product market that resulted in the different parameter estimates and different relationships. These findings and their implications are discussed in the next chapter.

CHAPTER SEVEN
IMPLICATIONS AND CONCLUSIONS

This chapter begins with a summary of the major contributions of this research project. The first section also outlines the process used in the dissertation to explore entry strategies. In the next section is a brief summary of the empirical results of this research. Limitations of the research are discussed next. A discussion of the implications of the results follows.

For researchers directions for further research are provided. For managers the usefulness of the model and the general results are highlighted. Finally, the implications of the research for the microcomputer software industry are summarized. The chapter ends with a brief conclusion.

Research Contributions

The research in this dissertation makes two strong contributions to the marketing literature. First, a comprehensive conceptual model of entry strategy and performance has been developed. Second, this conceptual framework has been empirically tested in two different product markets. It accounts for a large amount of the variance in the performance of the products. Development and testing of the entry strategy performance model led the researcher through a number of challenges as new areas were defined, explored, and tested.

Definition of Entry Strategy

The first challenge in the study of entry strategies was the development of a comprehensive, yet parsimonious, definition of an entry strategy. This was necessary because most research in the area focused on only one or two major components of entry strategy. The stance taken in this dissertation was that the entry strategy comprises decisions, made

consciously or by default, that define the new product in its product market. In Chapter One an entry strategy is described in terms of the three major managerial decisions that occur during, or before, entry into the market. These components of an entry strategy are: 1) the timing of the entry, 2) the magnitude of the entry, and 3) the area of competitive emphasis (Figure 1.3).

Development of Overall Model of Entry Strategy Performance

The managerial decisions required at entry can be studied by examination of the resulting implemented decisions: timing of entry, magnitude of investment and the resulting competitive positioning (Figure 2.1). With this definition established, the literature was examined for relationships between these different aspects of entry strategy and long-term performance. A conceptual model of entry strategy performance was then developed (Figure 2.2). It integrates previous empirical findings and uses Day and Wensley's (1988) conceptualization of competitive positioning (Figure 2.3). Research propositions were developed from the literature.

Operationalization of the Entry Strategy Performance Model

The next major challenge in the dissertation was to test the total model empirically. No study of entry strategies before had ever attempted to examine the relationship between so many constructs at once. This was necessary as prior research had led to different and sometimes opposing empirical findings. Only through the examination of a system of well-measured constructs could the interrelationships between the constructs be sorted out. This required the use of structural equation modeling. It also allowed the simultaneous examination of both the measures and the structural results. Partial Least Squares was used as it is the most appropriate structural modeling technique, given the nature of the data set used. (See Chapter Three for a thorough discussion of this choice.)

An empirical test of the model requires a data set that could 1) yield both product market characteristic and entry strategy measures at entry and later at a performance date, 2) furnish multiple measures of the construct, and 3) be generated within a limited period. The microcomputer software industry was ideal for many reasons:

1) As the industry only began in 1981 there was a limited period to search for the information.

2) The industry is characterized by short product life cycles.

3) The information was readily available on the most difficult construct to measure: competitive positioning.

4) Finally, the information could be collected solely through archival sources allowing the entry measures to be as 'pure' as possible.

That is, they would not suffer the problems that retrospective data collection encounters. Two product markets within the business category of microcomputer software were selected for empirical examination. These were business word processing and business graphics.

The operationalization of the constructs for testing raised many measurement issues never before addressed in the entry literature. These issues were resolved in Chapter Four. They are summarized below.

1. What measures should be used for the first entrant?
2. At what "date" should the performance measure be measured?
3. How should a product market be defined?
4. What is a new product?
5. What specific software products should be examined?
6. How should the entry period be defined?

Finally, the operationalization of the constructs required the identification of multiple measures to capture the true meaning of the constructs. This challenge was answered by using several sources for the data.

Use of Archival Data Sources

Archival data collection allowed the testing of the entry strategy performance model. The most significant advantage that this methodology has to offer in this type of study is that it is possible to reduce the

amount of distortion that occurs when cross-sectional and/or retrospective data are collected. One need not be limited to only the survivors who care to respond to questionnaires. Since the data used are not based on fallible memories, colored by performance results, the quality of the data is higher. Also from a measurement point of view, multiple sources and types of measures gathered archivally lend credibility to construct measurement as the original data have often been created with either different methodologies or different purposes or both.[1]

To use archival data effectively the researcher must be creative and relentless in the search for measures. Once a researcher has the fundamental research questions he or she must decide what could be used as surrogates or measures for the constructs involved. Here it is essential that one not limit oneself only to measures previously used in other studies. The meaning of the construct must be thoroughly understood so that the researcher can be open to and possibly even create non-traditional measures[2]. Then these measures must be located. This is where the researcher must be open to the information that exists. Not only is each known potential source a possible data source, but it may provide a measure for another construct or a lead for another data source. As in this dissertation, to measure all constructs effectively, many different data sources may be needed.

A major contribution of this dissertation, therefore, has been showing how the use of archival data can enable a researcher to address questions that previously appeared to be too costly to research thoroughly. The only drawback to archival data collection is the length

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[1] Specifics advantages for this dissertation were thoroughly discussed in Chapter Three.

[2] Examples of non-traditional measures in this dissertation include the following: citations measures for performance, both timing measures, the investment measures, the advertising measure for number of active competitors and the measures for magazine coverage. None of these were used in the existing literature. All are good measures, and in many cases, superior to the measures used in previous studies.

of time it may take to locate, retrieve, and code the data. Nevertheless, in many research areas such as this one, it is the best alternative. Other researchers should consider this methodology, not as a last resort, but as a viable research methodology with significant advantages.

Empirical Test of the Entry Strategy Performance Model

The ability of the model to explain/predict performance was examined empirically. Not only does this dissertation include the first empirical test of a comprehensive model of entry strategy performance, it also includes a replication in a second product market. These two tests show the usefulness of this model. The results clearly demonstrate that the entry strategy the firm undertakes at the time of entry into the market affects its long-term success in the market. The specific empirical findings are listed in the next section.

Summary of Findings

In both product markets the entry strategy performance model did a good job of predicting performance (R^2 > .80 for both and Stone-Geisser > .50 for both). Figure 7.1 summarizes the structural model established in both product markets. Where a path was both significant and showed the same directional relationship it has been marked. These and other significant findings are summarized below.

Product Market Specific

Magazine Coverage. Higher levels of Magazine Coverage during the entry period lead to higher levels of long-term Performance. This was the strongest predictor of performance in both product markets. A product which can receive recognition and acclaim during its entry period fares much better in the microcomputer software industry.

This is not a construct included in the general entry strategy performance model. This finding highlights the importance, to both the

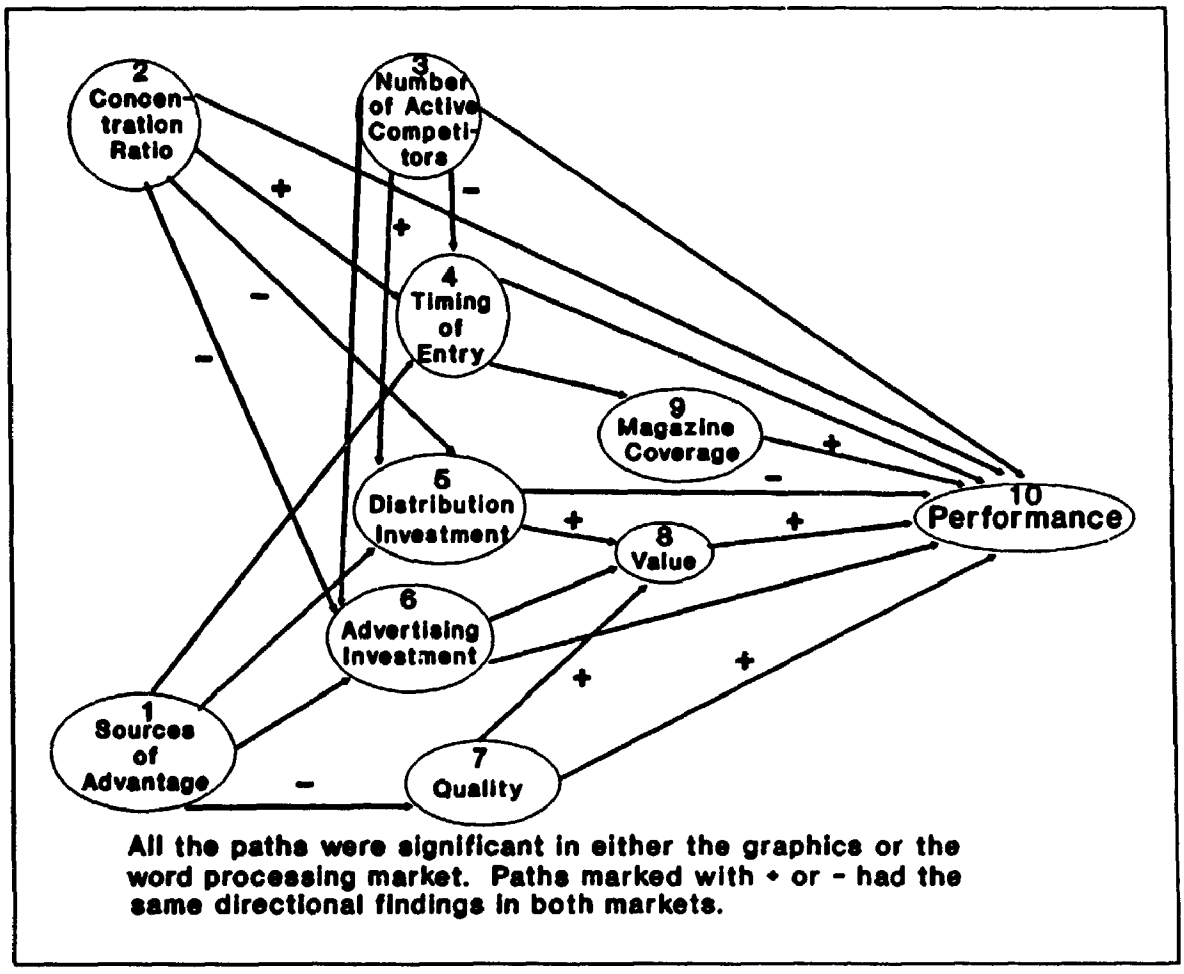

Figure 7.1 Summary of Research Results: Word Processing and Business Graphics Product Markets

researcher and the manager, of understanding the product markets of interest. Researchers doing cross-sectional studies are unable to incorporate this type of market specific competitive conditions into research.

In this test of the entry strategy performance model, although magazine coverage was important in both markets, advertising investment was not. It is likely that in most product markets some combination of a firm's investment in its communications programs during the entry period: advertising, publicity (magazine coverage in these product markets), and sales force may affect the long-term performance of a new entrant. Researchers and managers need to consider potentially key success factors

in each product market to decide 1) which areas to study, or 2) which areas to invest.

Entry Strategy Components

After Magazine Coverage, the Quality and the Value constructs were the strongest predictors of performance in both markets. This is an interesting finding, especially given the number of studies which ignore competitive positioning and examine only timing as an entry strategy. Timing, although significant and important in both markets, was not as strong a predictor of performance.

Competitive Positioning: Quality. Higher Quality at the time of entry into a market leads to higher long-term Performance.

Competitive Positioning: Value/Pricing. The higher the perceived Value of the product, the greater the long-term Performance of the product. The one measure used in both product markets (most important in both) compared two prices for the same product. The findings show that a product that is simultaneously available at a high manufacturer's suggested retail price and a lower price in other channels had better long-term Performance.

Magnitude of Investment: Distribution. The negative relationship between Distribution Investment and Performance seems to suggest that one can invest too much in distribution. However, given the nature of the measure for Distribution Investment, this result should be interpreted with caution. With more accurate measures this result may or may not hold.

The positive path between Distribution Investment and Value may be an artifact of the data. If a firm offered products for sale by mail order, it was generally selling its products at two different price levels. Thus there would be a positive path between the two constructs. Another interpretation is that an investment in multiple channels (a

higher investment) could lead to a better perception of value for the product by consumers.

Magnitude of Investment: Advertising. The higher a firm's relative investment in advertising during the entry period, the better the product's long-term performance. This was supported in the word processing product market. In the graphics product market there is a small, but significant negative path between Advertising Investment and Performance.

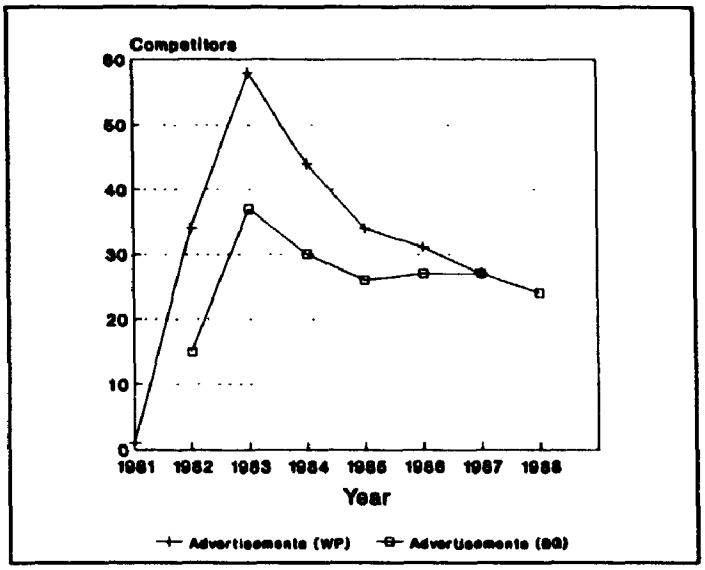

Figure 7.2 Volume of Advertising During Entry Period

The advertising pattern in the two markets is very similar (Figure 7.2) with the number of active advertisers at its highest in 1983. In 1983 word processors were competing on similar dimensions. This was not the case in business graphics. Not only were the products quite different but the hardware for display (critical for graphics) was still evolving. The different results in the two different product markets is likely due to the fact that many entrants in the business graphics market entered while the market was still evolving. Consumers were hesitant to purchase, not knowing what criteria to use or hardware to buy, so advertising during the entry periods was not as effective as it was in the word processing product market.

Although the direct and total effects of advertising investment in the graphics market was negative on long-term performance there is a high correlation (R^2 = .457) between these constructs. This result, coupled

with the results from the word processing product market, provide support for considering Advertising Investment's as a part of an entry strategy.

Timing of Entry. The results here clearly show the importance of the Timing of Entry on performance as it was a strong predictor of performance in both product markets[3]. As was noted in the literature review, many of the published research results show early entry to be associated with success, while others show later entry to be associated with success. The results here indicate that the effect of timing may depend on the product market itself and that there is no single overriding performance effect of the timing of entry into a market.

In the word processing product market there was a negative relationship between Timing of Entry and Performance. This was shown by the total effects and the correlation between the latent constructs. The opposite was true for the business graphics product market. These results say that early entries in the word processing product market garnered advantages that led to better long-term performance. In the business graphics product market later entrants enjoyed better success. As discussed in Chapter Six, the different development processes in the two markets may account for these differences. That is, in the word processing product market consensus about what makes a good word processor developed quickly. It was several years in the business graphics product market before the products were produced with similar features.

Entry timing was shown not only to have a direct effect on performance but also to affect performance through Magazine Coverage. Early entrants in word processing got greater coverage, while later entrants in the graphics market got greater coverage. In both product markets higher Magazine Coverage resulted in better Performance.

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[3] Only Magazine Coverage, Quality and Value were stronger predictors of performance.

Other Constructs in Entry Strategy Performance Model

The three constructs discussed in this section not only had the smallest effect on Performance, but also had inconsistent findings with Performance across the two product markets.

Sources of Advantage. The major finding here is that there is a negative relationship between Sources of Advantage and Performance. That is, there was a negative relationship between the size of a firm, the entry experience of a firm and the resulting quality level of the product. Larger, more experienced firms had poorer quality entries than the smaller, less experienced firms. The smaller firms seemed to be able to tailor their products to the state-of-the-art hardware. Larger firms generally had an investment in software from other hardware and were slow to adapt. Possible reasons for this include: large bureaucracies slowing innovation or protection of old cash cows.

The paths between Sources of Advantage and the other constructs (Timing of Entry, Distribution Investment, and Advertising Investment) were not consistent across the two product markets.

Product Market Characteristics: Concentration Ratio. Given the limited range of values on this construct (medium to high levels of concentration only) it is surprising that there were any consistent results across the product markets. Still, this was not the case for the primary relationship. Between Concentration Ratio and Performance there were mixed results both within and across markets. The total effect and the correlations had different signs both within and between markets. No conclusion can be reached concerning these results. However, in both product markets there was a positive path between Concentration Ratio and Timing of Entry. There was also a consistent negative path between Concentration Ratio and both types of Investment.

Product Market Characteristics: Number of Active Competitors. The relationship between Number of Competitors and Performance was consistently positive in the word processing product market and consistently nega-

tive in the graphics product market. On the surface, these results do not make sense as one would suspect more competitors over time and, therefore, the same path sign between Number of Competitors and Performance and Timing of Entry and Performance. The results are the opposite in both product markets. There is, nonetheless, a simple explanation for this observation.

There were originally two measures for the Number of Competitors. One was dropped because it was almost identical with the timing measures. The remaining measure is the number of active, advertising competitors, during the entry period. Considering this measure, the results indicate that in the word processing market products that entered when there were many active competitors did better. The opposite was true for the business graphics product market. It is unclear why this should be the case.

Research Limitations

Constructs in Model

Main Effects Model. Increasingly strategists advocate a contingency perspective. In the context of entry strategies this suggests consideration of market conditions when making any strategic or competitive positioning decisions. The model described in this dissertation is a main effects model. That is, the results tell us the strongest effects under varied conditions. Good relative quality, value and market exposure (magazine coverage and advertising) are important under all the different observed entry conditions. Managers would do well to consider these constructs any time they plan to enter a market or to alter their product's competitive positioning in the market. Determination of the best time to enter a market and additional positioning dimensions on which to compete need to consider the specific product market conditions at entry.

Weak Findings for Product-market Characteristics. The product-market characteristics were included in the model to be sure it was the entry strategy affecting performance and not the conditions in the environment. There were small parameters and small non-significant correlations between the product-market constructs and performance. The direction of the results also differed in the two product markets. It was concluded that in these product markets it was the entry strategy itself and not the market characteristics that affected the long-term success of the product.

The weak findings for the product-market characteristics are not surprising in this study. If, as Carroll (1982) suggests, the median performance of an industry is determined by macroenvironmental factors, this should come as no surprise. Also, the variance in the product-market constructs is very small in these product markets, as in most single industries, in comparison to the variance across industries. To test the effect of these and other product-market characteristics on performance, a multi-industry study is required in which products from many product markets would be included.

Distribution Investment Measures Weak. The measures for Distribution Investment were weak. The only available data were dichotomous for the various types of entry channels. Although use of a channel would require higher expenditures this could include a wide range of investment.

Research Design

Interim Changes in Competitive Positioning. The entry strategy performance model, as developed in this dissertation, ignores the changes that may take place in the market between the time of entry into the market and the time of the long-term Performance measure. The relative competitive positioning of a product changes over time from its initial location. This occurs because either the competitors' products are changing or the product itself is changing in relation to the competitive

offerings. Therefore a limitation with this model is that it does not include these changes[4].

This was intentional to keep the model parsimonious. This was done by examining only the initial strategy and the resulting performance and not the intervening changes. Examination of only the entry strategy and conditions and the long-term performance is a conservative test of the model. That is, other changes, which theoretically could affect the product's long-term performance were ignored in the model. With this conservative test, the entry strategy has been shown to have a significant effect on performance. This shows that entry strategy is important to the long-term success of a product.

Related Product Markets. Although the entry strategy performance model was tested in two different product markets, they were related markets. That is, they are both types of microcomputer software. One could, therefore, argue that similar results should be expected. Although the model did a good job of predicting performance in both markets, many findings differed. (This is shown by the paths in Figure 7.1 that are not marked.) This is likely because there are a large number of differences between the two product markets (enumerated in Chapter Six). Further tests of this model in other product markets would strengthen the acceptance of the entry strategy performance model.

Data Analysis

When developing and revising a measurement model ideally two sets of independent data are necessary. One is used to eliminate poor measures. The other can be used to test the revised model. Unfortunately, this luxury was not possible in this dissertation. In the study of each product market the entire product market was examined. All products in

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[4] If one wanted to include these changes in the model they could be accommodated by changing the performance construct in the model to short-term performance and following it with revised competitive positioning. These constructs could be cycled as many times as desired until one eventually arrived at long-term performance.

the population where data were available were included in the data sets. For each product market both the original and the revised measurement model use the same data. The difficulty that arises with the use of the same data is that then the strength of the measures may be exaggerated because you are capitalizing on the sameness of the sample of data.

This is not a problem in this dissertation for two reasons. First, all measurable cases in the population are included in the analysis. Chance selection of a sample would not, therefore, affect the identification of the poor measures. Second, a replication in a second product market is included in the dissertation. The original measurement model for both product markets was identical, except for measures that could not be fully developed in the graphics market. It should be noted that the revised measurement models are very similar for the two product markets.

Implications

Implications for entry theory and research

As with any research project answers to some questions lead to additional questions. The entry strategy performance model developed and tested in this dissertation can and should be tested elsewhere. The generalized operational version of the entry strategy performance model supported in this dissertation is presented in Figure 7.3. It is a generalization of the structural model developed for the microcomputer software industry (Figure 7.1). Figure 7.3 is a more generalizable model which can be directly transferred to other product markets for use by researchers. Figure 7.4 is a diagram of the managerial or theoretical summary of the model. With knowledge of the specific product market the research and manager can choose to investigate or invest in appropriate dimensions of each high level construct in the models.

Figure 7.3 shows several constructs (Performance, Sources of Advantage, and Timing of Entry) that should be present in any test of this

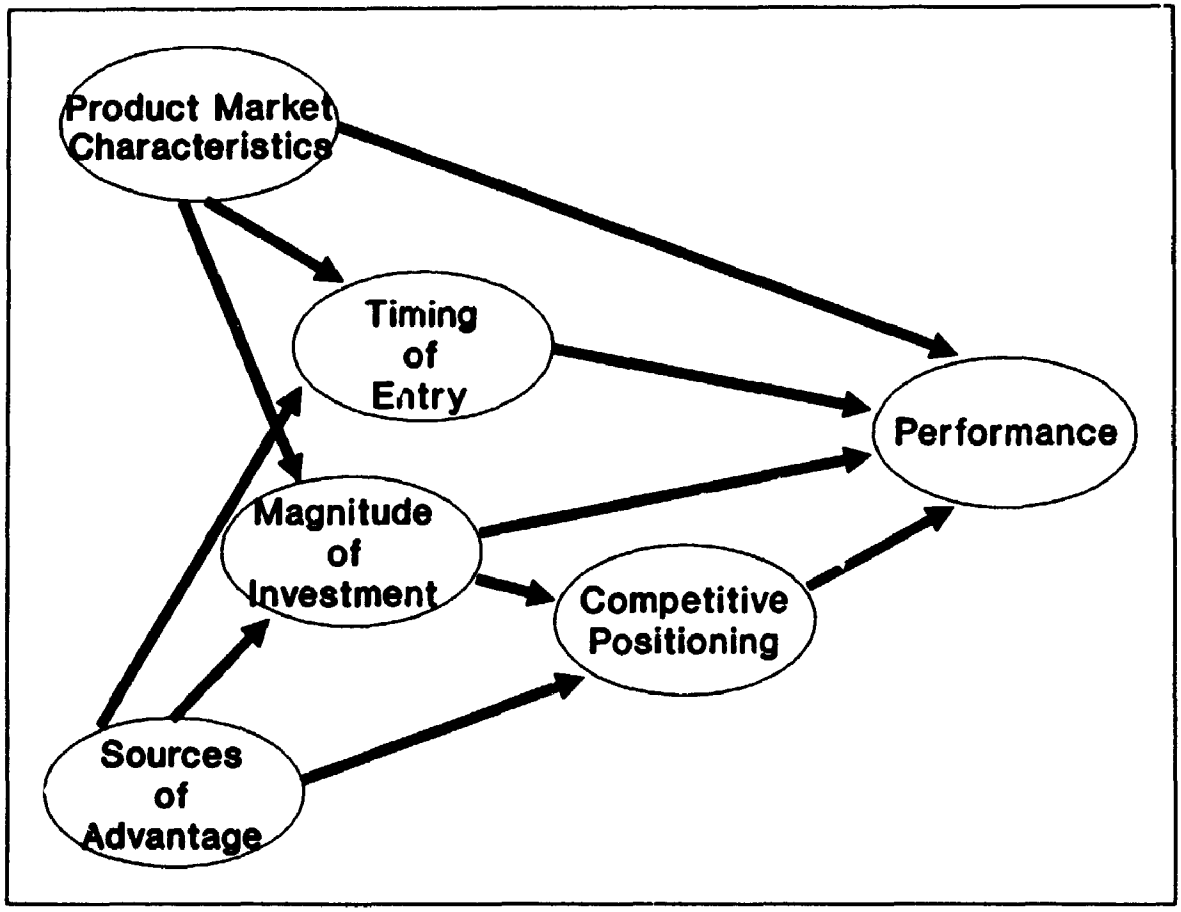

Figure 7.3 Entry Strategy Performance Research Model

model. It also includes several higher level constructs (Product Market Characteristics, Magnitude of Investment, and Competitive Positioning) that may need to be broken into specific constructs when the model is operationalized for another product market. This model is general enough to be adaptable to any product market. Simultaneously, it shows the essential elements present at entry that affect the long-term performance of the market. Decisions regarding the actual measures and constructs will be dictated by the specific product market. Likely measures or constructs for most product markets are summarized in Table 3.1. The results of this research suggest that when competitive positioning is operationalized that the dimensions of quality and value (or pricing) be considered as they were highly significant in both markets. The findings

also suggest inclusion of some element of the communications mix as an important part of an entry strategy investment.

Possible areas for future research include:

1. Empirical examination of the entry strategy performance model in other product markets is suggested. It would be interesting to see if the relationships that were significant in both the word processing and graphics product markets are significant in other product markets. This would strengthen these findings.

2. The research results showed strong support for the components of an entry strategy, but weak support for the measured product-market characteristics. Simultaneous empirical examination of many product markets would allow a better assessment of the effect of product-market characteristics on performance.

3. Extended examination of the entry strategy performance model to include interim competitive positionings over the life cycle of the entry products would add to the model and could explain more of the long-term performance of the product. The results of this study would be important to managers. They need to know if changing a poor initial competitive positioning to a better one helps improve the long-term success of a product.

Implications for managers

The empirical results of the test of the entry strategy performance model provide support for the entry strategy performance model. This model can be used by managers when planning the entry of new products. The model can be used in two ways. First, a manager could consider the explicit results of this study (summary in Figure 7.1). If he or she believes conditions are similar enough in the industry of interest, one could expect similar relationships to be important. This would be especially true for the strongest findings: quality and value for competitive positioning, timing of entry, and investment.

With specific product market information a manager can use the entry strategy performance model to see what entry strategy actions could be taken to improve the long-term performance of the entrant product. This analysis could be developed as was discussed in the previous section for researchers. Although gathering industry specific data and calibrating

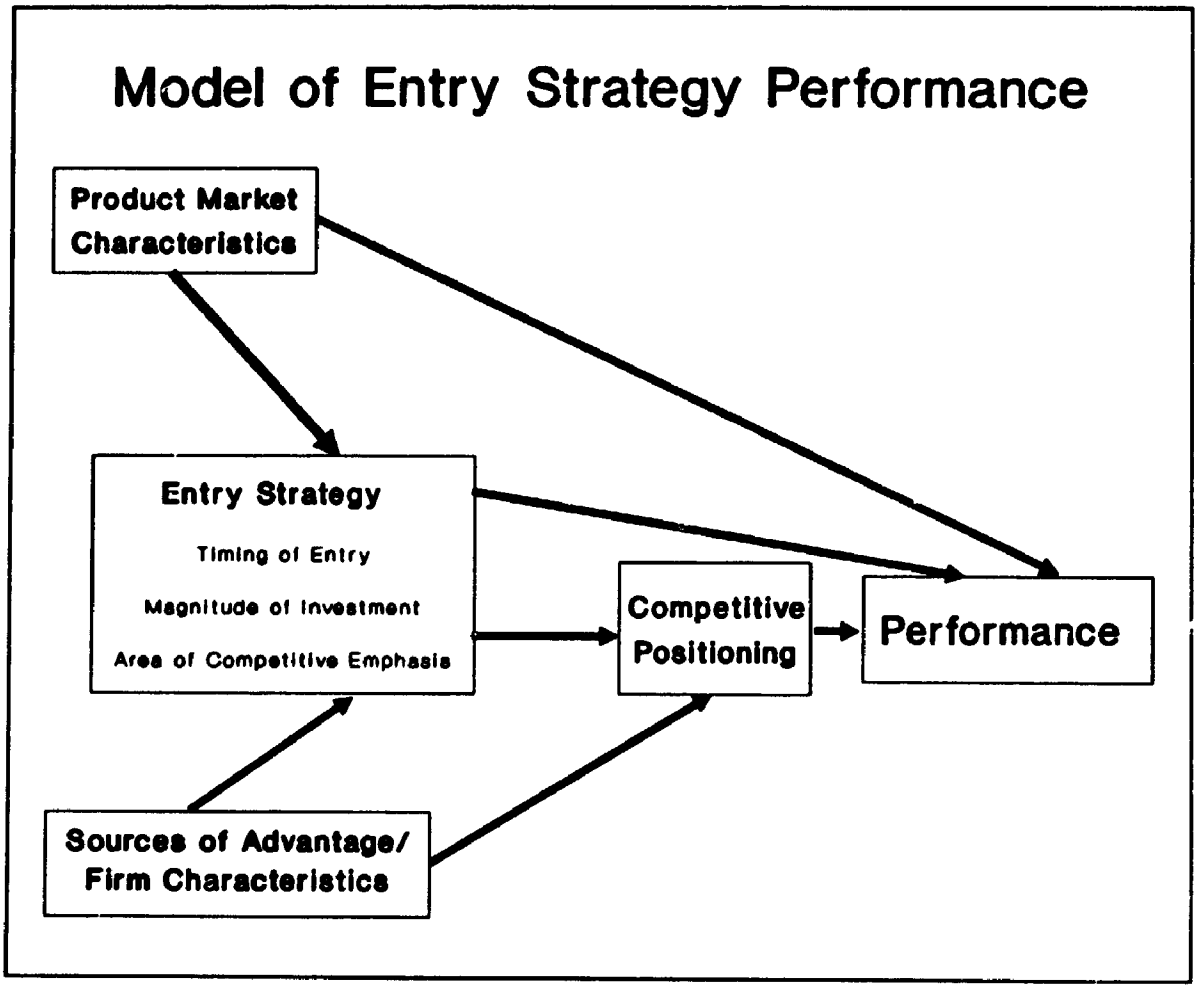

Figure 7.4 Entry Strategy Performance Model Managerial Model

the model would make the decisions most accurate[5], the best use of the model by managers may be to use it as a decision-making aid.

Figure 7.4 is a diagram of the concepts integral to long-term entry performance. This diagram would be most useful to managers as an aid to decision making. It can be used to help managers identify the key areas they should be considering when making new product entry decisions. Using their judgement and knowledge of the industry, informed managers can then use the model to anticipate results from different entry strategies. This

[5] In many industries these data are difficult or impossible to collect. In all, if the entry is early, there would not be enough data to assess the market. Once the data were available (after the market had developed) it would be too late to implement many of the better entry strategy decisions.

active use of the model should help them improve their entry decision making because its use forces managers to consider explicitly entry factors that have been shown to affect long term product performance.

Figure 7.4 summarizes not only the key entry strategy decisions but also draws attention to the other important areas that affect long-term performance. Implicit in the entire model is the concept that the key to success is producing a product desired by consumers that is well positioned vis-à-vis competitors (competitive positioning). This can be achieved through a good entry strategy. With it one decides what is important for a product in the product market (the area of competitive emphasis), what investments need to be made to produce and distribute the product, and when the best time is to enter that product into the market. The competitors and the market characteristics (product market characteristics) and the firm's strengths (sources of advantage) will affect not only the firm's entry strategy but its eventual success in the market.

Implications for managers in the software industry

All managers can use the model as described above to help improve entry decisions. Managers in the microcomputer software industry should consider not only the general findings, but also the specific findings as they apply to that industry. These findings and their implications are discussed in this section.

For most entrants in the microcomputer software industry the results of this empirical study can be directly applied to the entry of a new product. Clearly, some results will vary from one product market to another, as happened between the word processing and the graphics product markets. When the results are the same in both markets (Figure 7.1), it is likely that these results will hold for new entrants not only across these categories of microcomputer software, but also across others as well.

An important finding for this industry is the negative path between sources of advantage and quality. Given the high rate of firm acquisition in the last few years in the microcomputer software industry, the large firms seem to recognize the problem. Many are attempting to solve it by buying out small competitors with innovative quality products. This can only be a short-term solution. If all the larger firms use this strategy, bidding wars will result, wiping out profits to the successful acquirer, and leaving the losing bidder without a new product. Large firms must internalize what is required to produce quality products. In both product markets quality had the second highest path coefficients in the model. The quality of the product at entry is important to the long-term success.

The highest correlation between a single construct and performance was between magazine coverage and performance in both markets (R^2 over .3 in both markets). The path between these two constructs was also the highest in both markets. Obviously, the best predictor of long-term success in the microcomputer software industry is the amount of magazine coverage the product receives during its entry period. Positive product reviews and citations are directly related to the long-term performance of the product.

Clearly, citations alone would not be enough to guarantee a successful product. The consumer not only needs to become familiar with the product but also want to purchase it for some reason. This explains the importance of the favorable and very favorable product reviews and the unimportance of the mixed and negative product reviews (which were dropped in developing the final measurement model in both markets). Favorable reviews generally require good competitive positioning: good value and good quality. These coincidentally are also highly related to the long-term performance of the products.

It should be noted that some findings are not as important as others. For example, the negative relationship between distribution investment and performance seems to suggest that one can invest too much

in distribution. However, given the nature of the measure for distribution investment, it is suggested that this result should be interpreted with caution. With more accurate measures this result may or may not hold.

The microcomputer software industry is like many industries (e.g., durable goods) where replacement of a product occurs infrequently. A product is purchased and used over a long period. Repairs (or upgrades in the microcomputer software industry) are undertaken to maintain the original product. In the microcomputer software industry it is likely that the consumer considers both the monetary cost of the product (its price) and the time cost (learning time) when purchasing a product. This means the product must have a strong enough image to entice new users and to maintain old users. Only if the old product fails, or the new products on the market are clearly superior, will the user purchase a new product again. There is high customer loyalty in this industry.

As each product market in the microcomputer software industry develops, barriers to new entry are formed. These barriers are a direct consequence of the competition and successes of incumbents (older entrants) in the product markets. In the microcomputer software industry three barriers to entry can be clearly identified. These are listed below.

1. Quality/ features inherent in the program have increased over time. A new entrant must be able to duplicate these and provide additional benefits to succeed.

2. User bases have developed loyalties to certain packages. These are hard to break through. A new entrant must have a superior product to compete.

3. Add-on products have helped the sales of the original. These add-on packages have helped make some products business standards.[6]

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[6] Within an organization there are generally many microcomputer users. These users often have a need to exchange data or text. This is facilitated when all users create their work in the same packages. The information can then be readily used by other users. Over the years, as many businesses adopt the same products they become the standards in the industry. For example, currently *WordPerfect* is the word processing standard employed by most organizations.

Individuals and firms have too much invested, time and money, to change for minor improvements.

New entrants into old product markets must consider these barriers to entry when deciding upon their entry strategy.

Conclusion

In Green and Ryans (1990) the rudiments of the entry strategy performance model detailed in this dissertation were tested in a simulated business environment, *Markstrat*. This dissertation presented a more thoroughly developed and more theoretically based entry strategy performance model. It extends the earlier work by testing this model in two 'real world' product markets. The findings support both this earlier work and the entry strategy performance model.

The entry strategy performance model does an excellent job of predicting/explaining the performance in both the word processing product market and graphics product market in the microcomputer software industry. The widely available data in this industry and the industry's rapid development allowed the operationalization of the entry strategy performance model. These product markets are similar to many other product markets both within and outside the microcomputer software industry. The results, therefore, provide support for the general conceptual model of entry strategy performance.

Where purchase or repurchase of products will occur over long intervals and the cost of the product is high, the original positioning image will be maintained for a long time. In all industries, but in these industries especially, managers must actively decide upon their entry strategy. To just let timing, investment and competitive positioning decisions happen, rather than to take control of them, is an abdication of responsibility by managers. Neglect of the entry strategy decisions, without doubt, has contributed to the failure of many product entries.

APPENDIX

Data Collection Process for Dissertation

Table A.1 Steps of Data Collection

I. Collect and code advertising data for all products in the six categories of business software.

II. Get background information on product class--general information about market, entrants, growth, changes, etc. Major sources include reviews, articles, etc.

III. Get comprehensive reviews for the software class for the years 1981 through performance year.

- A. Code product's own & review's best product ratings
  - 1. prices
  - 2. features
    - a. number of 'general' features
    - b. copy protection
    - c. compatibility
      - (1) printers
      - (2) import/export facilities
  - 3. editor's choice
- B. Enter the data into the database
- C. Look Up/Code mail order prices

IV. Determine the products to be included from Reviews.

V. Determine Dates of Entry for Each Product; Code Them.

VI. Using Date of Entry Find and Code the Following Data

- A. Timing Measure: Number of Competitors
  - 1. Get all competitors in class from advertising
  - 2. Add competitors from reviews
  - 3. Add competitors from clippings
  - 4. Add competitors from Data Sources
  - 5. Add competitors from summary articles
- B. Look up in Data Sources
  - 1. Sources of Advantage: Employees & Sales
  - 2. Date of Establishment (Prior Entry Experience)
- C. Look Up Distribution Information
  - 1. from Advertising File
  - 2. from other sources: articles, etc.

Table A.1 (continued) Steps of Data Collection

D. Look up/Code Prior Entry experience
   1. Advertising File
   2. Data Sources

E. Look Up/Code Advertising Data--by month after DOE
   1. information for product sales
   2. information for class of sales by month

F. Look Up/Code Magazine Coverage/Publicity Data
   1. Software Reviews
      a. do on-line search for year of entry & next
      b. look up exact date rating in review
   2. Product Announcements: on-line & look up dates
   3. Other document types: articles, letters, etc.

VII. Determine the Date of Performance Measure Then:
   A. Code the two market share measures from Software Magazine
   B. Look up/Code the business Citations from ABI/Inform
   C. Look up/Code Industry Citations--Microcomputer Index

VIII. Look Up and Code Product Market Characteristics
   A. Concentration Ratio--from Software Magazine
   B. Number of Competitors
      1. From Advertisements
      2. From Data Sources
   C. Growth Rate--multiple sources get, guesstimate*
   D. Market Size--multiple sources, guesstimate*

*There were not enough data available to calculate a guesstimate.

Data Coding/Computations Prior to PLS Analysis

Table A.2 Data Coding/Computations Prior to PLS Analysis

1. Set up an AskSam file for the advertising data.

2. Set up a master AskSam file for all other data for each product.

3. Collect all available data as listed in Table A.1.

4. Estimate any missing values:
   (e.g., for number of employees and sales: regression)

5. Code both measures of the following constructs: timing and number of competitors. The raw data are placed on a spreadsheet. The calculations are completed on it then it must be coded and entered into the master AskSam file.

6. Calculate the relative ratings for PLS analysis from the raw data and also code them in the AskSam master file
   A. For each of the Competitive Positioning Constructs
   B. Advertising: For Appropriate Period (Six Months)

7. Develop Program to Extract Data From AskSam File

8. Put information into SPSS PC to generate data in correct format for PLS

9. Run PLS analysis.

10. Upload information to mainframe to run PLS jackknifing program.

Technical Information About Partial Least Squares Analysis

Formative or Reflective Indicators

Partial Least Squares analysis allows the researcher to model latent constructs with either formative or reflective indicators (see Figure 1). Choice of direction is based on one or more of the following considerations: 1) theoretical relationship between the construct and its measures, 2) the objective of the study, 3) endogenous or exogenous constructs, or 4) empirical reasons. These considerations are discussed below.

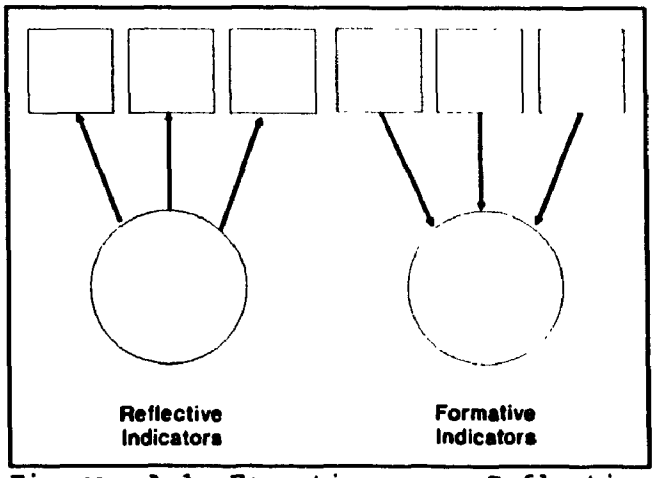

Figure A.1 Formative or Reflective Indicators

The theoretical relationship between a latent construct and its manifest variables is modelled by choosing the appropriate direction for the relationship. Formative constructs are "formed" from the measures themselves. These constructs are defined as a composite of the measures. The publicity or magazine coverage construct is a formative construct defined by software reviews (of varying levels of favorability) and other magazine citations.

The measures of reflective constructs, on the other hand, "reflect" the underlying construct. That is, the latent construct "gives rise to" or causes the measures. The expenditure of funds on advertising gives rise to the advertisements that appear. The size and quantity of advertisements, therefore, 'reflect' the amount of investment the firm has made in advertising.

The PLS algorithm, a series of regressions, must also be considered when one makes a decision regarding the direction of the indicators. This is because the explanatory power is "strengthened" in the direction of the

arrows in the model. All reflective indicators will 'strengthen' the measurement model, while all formative indicators will 'strengthen' the structural model. This is because "...mode A [all reflective indicators] minimizes the trace of the residual variances in the 'outer' (measurement) equations and mode B [all formative indicators] minimizes the trace of the residual variances in the 'inner' (structural equation, both subject to certain systematic constraints" (Fornell and Bookstein 1982, p. 442).

Lohmoller (1981) suggests the use of formative constructs for exogenous variables and reflective constructs for endogenous variables. This pushes the explanatory power of the data onto the endogenous variables, presumably those of greatest interest in the study. If the objective of the study is the maximum explanation possible of the variance in the dependent manifest variables, all constructs should be formative except the dependent construct of interest.

There are occasions when empirical considerations will override the other decision rules for the establishment of which constructs are formative and which are reflective. Examples of these are summarized in the accompanying table.

It is possible to apply all the decision rules and have all the decisions for a block concur. This, however, is unlikely. In this event the researcher must decide upon the overriding concern of the study. Unless there is an overriding objective for variance explanation (see the accompanying table for examples) the choice should be made based on the underlying theoretical relationship between the construct and its indicators. If these are unclear then the endogenous/exogenous default rule should be used. Finally, if in the course of the analysis it becomes apparent that the choice of direction is hindering the PLS analysis, the direction of the relationship may be changed.

Table A.3 Choice Criteria for Formative or Reflective Indicators; Relationship Between Observables and Data

Rule	Formative	Reflective
Theoretical Relationship		
	The Unobservable Construct is Defined by the Observable Measures	The Observable Measures Reflect or are caused by the Unobservable Construct
Study Objective		
-Maximize Observed Variance	None	All Constructs in the Model (Mode A)
-Maximize Abstract or Unexplained Variance	All Constructs in the Model (Mode B)	None
-Maximize Variance in the Observed Criterion Variables by Way of the Unobservables	Exogenous Constructs	Endogenous Constructs
-Maximize Explanation of the Variance in the Dependent Manifest Variables	All Constructs Except the Dependent Construct of Interest	Only the Dependent Construct of Interest
Empirical Considerations		
-Highly Collinear Indicators	Multiple Regression; Weights Are Affected and May Be Unstable	Simple Regressions so No Impact
-Singular Covariance Matrix for a Construct (one Manifest Variable fully dependent on all others)	Don't Use	Simple Regressions so Eliminates Problem
-Sample Size	----------	The Number of Cases is Small Relative to the Number of Manifest Variables in the Block

Formulae for Reliabilities and Average Variance Explained

The following formulae are used for the calculation of the reliabilities and average variance extracted from the PLS model in this dissertation. These equations were published by Fornell and Larcker (1981) and are reproduced below.

Single Measure Reliabilities. The reliability of the single measures is calculated using the formula published by Fornell and Larcker (1981):

$$\rho_y = \frac{\lambda_y^2}{\lambda_y^2 + var(\epsilon_y)}$$

where
ρ_y is the reliability of each measure in a single factor model
λ_y is the factor loading of y on its construct
ϵ_y is the measurement error

With standardized variables the denominator reduces to one. The reliability of the measure is, therefore, simply the squared loading.

Composite Reliability for each Construct. The composite reliability provides a measure of internal consistency for the construct.

$$\rho_\eta = \frac{(\sum_{i=1}^{p} \lambda_{yi})^2}{(\sum_{i=1}^{p} \lambda_{yi})^2 + \sum_{i=1}^{p} Var(\epsilon_i)}$$

where
ρ_η is the composite reliability for the construct η
λ_y is the factor loading of the ith y on the construct
ϵ_i is the measurement error of the ith y measure
p is the number of multiple measures for the construct

Average Variance Extracted. The equation for the average variance extracted follows:

$$\rho_{vc(\eta)} = \frac{\sum_{i=1}^{p} \lambda_{yi}^2}{\sum_{i=1}^{p} \lambda_{yi}^2 + \sum_{i=1}^{p} Var(\epsilon_i)}$$

where
$\rho_{vc(\eta)}$ is the average variance extracted
λ_y is the factor loading of the ith y on the construct
ϵ_y is the measurement error of the ith y measure
p is the number of multiple measures for the construct

This is the same as the mean of the squared loadings of the p measures of the η construct when the measures are standardized.

Correlation Results Comparisons: Between Measures Versus Between Latent Constructs

Throughout this dissertation the point has been made that the use of structural equation modeling yields richer construct measurement than first generation methods. Both the multiple measures and the association of the other constructs in the system give fuller meaning to the constructs. Without structural equation modeling the researcher would likely examine the correlations between each of the independent measures and each of the dependent measures. Use of PLS allows the researcher to combine all the different measures for each construct together to examine the relationship between the constructs and not the individual measures.

To illustrate these benefits a comparison of the results obtained with simple correlations between each measure for a construct and each performance measure in the word processing product market is calculated. The highest and lowest of the measures' correlations with the performance construct and the correlation between the latent constructs from the PLS analysis are reported in Table A.4. The number of significant correlations with a performance dependent variable is also listed.

An examination of the table indicates that the simple correlations between single measures generally resulted in lower correlations than between the latent independent constructs and the performance construct in PLS. This is as expected. The latent variables draw information from all the manifest variables providing a better construct measure and allowing better examination of the relationships between the latent constructs.

The better measurement of the constructs allows the researcher to discover the true relationship between the constructs. Stronger measures provide stronger tests for each of the hypotheses included in the model. True relationships between constructs are more likely to be supported. Similarly, if a true relationship does not exist between constructs this more likely to be uncovered with accurate construct measurement.

Table A.4 Comparison of Results:
Single Variate Hypotheses Versus PLS Results

Construct	Indicators	Number Signif Corr.	Highest/Lowest Corr.	PLS Corr
Sources of Advantage	Gen Entry Exp.	0	.06, .36	.20
	Employees	1	-.01, .37	
	Dollar Sales	1	-.01, .37	
Concentration Ratios	Installed Base	0	-.04, .05	.05
	Projected	0	.00, .15	
Number of Competitors	Advertising	0	-.02, .16	.07
Timing of Entry	Months	0	-.15,-.26	-.25
	Competitors	0		
Distribution Investment	Retail	0	.22, .29	.35
	Mail order	0	.27, .34	
Advertising Investment	PC Mag Vol	0	-.04, .04	.28
	PC Mag No	0	.00, .18	
	PCW Vol	1	.14, .55	
	PCW No	0	.05, .31	
Quality	Ed Choice	5	.27, .64	.51
	Features*	0	.28, .32	
Value	Relative MSRP	0	.14, .25	.57
	Discount	7	.43, .57	
Magazine Coverage	VFav Reviews	7	.38, .68	.77
	Fav Reviews	6	.32, .51	
	Oth. Citations	5	.06, .62	

*This is the collapsed construct. Before it was collapsed each of its components had the following number of significant correlations with performance: Feature 5, Copy 7, Help 7, Hardware 0, and Import/Export 1

Correlations Between Latent Variables

Listed below are the correlation matrices for the constructs, or latent variables (LVs), for two product markets examined in this dissertation. The constructs are identified by the numbers they were represented by in the tested structural models (Figure 5.4 and Figure 6.3). These are:

1 = Sources of Advantage
2 = Concentration Ratio
3 = Number of Active Competitors
4 = Timing of Entry
5 = Distribution Investment
6 = Advertising Investment
7 = Quality
8 = Value
9 = Magazine Coverage
10 = Performance

Word Processing: LV correlation matrix

1	1000									
2	180	1000								
3	-170	57	1000							
4	133	660	-161	1000						
5	-13	-350	196	-570	1000					
6	-103	-58	277	-371	341	1000				
7	-181	-314	122	-370	321	81	1000			
8	-78	-172	-65	-398	646	154	374	1000		
9	277	-45	98	-347	614	299	261	531	1000	
10	200	47	71	-245	353	284	511	568	767	1000
	1	2	3	4	5	6	7	8	9	10

Business Graphics: LV correlation matrix

1	1000									
2	-62	1000								
3	211	346	1000							
4	193	358	924	1000						
5	33	-116	-378	-436	1000					
6	202	-170	-110	-231	579	1000				
7	-7	83	111	37	350	577	1000			
8	-146	-149	-478	-546	739	562	484	1000		
9	22	91	497	468	129	299	454	125	1000	
10	-45	-8	193	122	345	457	652	422	805	1000
	1	2	3	4	5	6	7	8	9	10

Correlations Between Manifest Variables and Their Constructs

Word Processing

For all correlations there are 39 cases in the word processing product-market. The * and ** in the following matrices are defined as follows:

1-tailed Significance: * = .01 ** = .001

Entry Experience/Sources of Advantage
(Word Processing)

	YEARS	OTHER	HUMAN	RESOURCE
YEARS	1.00			
OTHER	.12	1.00		
HUMAN	.96**	.00	1.00	
RESOURCE	.96**	.00	1.00**	1.00

YEARS=General Entry Experience, OTHER= Software Related Entry Experience, HUMAN=Number of Employees, RESOURCE=Dollar Sales

Product-market Characteristics (Word Processing)

	CONCENIB	CONCENPP
CONCENIB	1.00	
CONCENPP	.96**	1.00
COMP6MAD	1.00	
COMPETDS	-.45*	1.00

CONCENIB=Concentration Ratio in Installed Base, CONCENPP=Concentration Ratio for Projected Purchases, COMP6MAD Number of Competitors in Advertisements First Six Months After Entry, COMPETDS=Number of Competitors in Data Sources

Timing of Entry (Word Processing)

	TIMINGM	TIMINGE
TIMINGM	1.00	
TIMINGE	.99**	1.00

TIMINGM=Months Since First Entrant, TIMINGE=Number of Entrants Since First Entrant

Magnitude of Distribution Investment (Word Processing)

	DIRECT	RETAIL	MAIL	SHARE
DIRECT	1.00			
RETAIL	-.07	1.00		
MAIL	-.07	.59**	1.00	
SHARE	.13	.28	.09	1.00

DIRECT=Direct Sales, RETAIL=Retail Sales, MAIL=Mailorder Sales, SHARE=Shareware

Magnitude of Advertising Investment (Word Processing)

	PCM6V	PCM6A	PCW6V	PCW6A	BYT6V	BYT6
PCM6V	1.00					
PCM6A	.34	1.00				
PCW6V	. 22	.23	1.00			
PCW6A	.16	.30	.56**	1.00		
BYT6V	.03	-.00	.13	.18	1.00	
BYT6A	.01	.29	.16	.25	.38*	1.0

PCM=PC Magazine, PCW=PC World, BYT=Byte 6=six months after entry,V=Volume of Ads (in Pages) A=Number of Ads

Competitive Positioning: Quality and Features
(Word Processing)

	EC	FEATURES	COPY	HELP	HARDWARE	IMEXPORT
EC	1.00					
FEATURES	.26	1.00				
The following variables were collapsed into 'Features'.						
COPY	.18	.19	1.00			
HELP	.17	.22	.13	1.00		
HARDWARE	.07	.92**	.09	.11	1.00	
IMEXPORT	.28	.63**	.25	-.03	.36	1.00
FEATURE	.49**	.64**	.25	.24	.35	.70**

EC=Editor's Choice, FEATURES=ALL Features, COPY=Copy Protection, HELP=User Friendliness, HARDWARE=Number of Printers, IMEXPORT=Number of Different Types of Formats for Importing and Exiting Files

Competitive Positioning: Pricing (Word Processing)

	PRICERET	PRICEOWN	PRICEMAL
PRICERET	1.00		
PRICEOWN	-.34	1.00	
PRICEMAL	.90**	.00	1.00

PRICERET=Relative Manufacturer's Suggested Retail Price, PRICEOWN=Discounted Price, PRICEMAL=Relative Low (Mailorder) Price

Magazine Coverage (Word Processing)

	REVVFAV	REVFAV	REVMIX	REVUFAV	CITTOTAL
REVVFAV	1.00				
REVFAV	.36	1.00			
REVMIX	.26	.24	1.00		
REVUFAV	.25	.04	.02	1.00	
CITTOTAL	-.02	.07	.06	-.03	1.00

REVVFAV=Very Favorable Software Reviews, REVFAV=Favorable Software Reviews, REVMIX=Mixed Software Reviews, REVUFAV=Unfavorable Software Reviews, CITTOTAL=Total Number of Other Citations

Performance Measures (Word Processing)

	ABII	MCI	MKT SH PP	MKT SH IB	BASE PCPC	BASEPC	CHANGE
ABII	1.00**						
MCI	.86**	1.00**					
MKTSHPP	.83**	.74**	1.00**				
MKTSHIB	.90**	.76**	.95**	1.00**			
BASEPCPC	.83**	.95**	.78**	.78**	1.00**		
BASEPC	.91**	.95**	.85**	.88**	.97**	1.00**	
CHANGEPC	.61**	.78**	.72**	.56**	.80**	.77**	1.00

ABII=Number of Citations in ABI/INFORM, MCI=Number of Citations in Microcomputer Index, MKT SH PP=Market Share Projected Purchases from Software Magazine, MKTSHIB=Market Share Installed Base from Software Magazine, BASEPCPC=WP Personally Used: PC Magazine Survey, BASEPC=Three WPs in Company: PC Magazine, CHANGEPC=If Change WP, Change to What: PC Magazine

Business Graphics

For all correlations there are 44 cases in the graphics product-market. The * and ** in the following matrices are defined as follows:

1-tailed Significance: * = .01 ** = .001

Entry Experience/Sources of Advantage (Graphics)

	YEARS	HUMAN	RESOURCE
YEARS	1.00		
HUMAN	.79**	1.00	
RESOURCE	.79**	1.00**	1.00

YEARS=General Entry Experience, HUMAN=Number of Employees, RESOURCE=Dollar Sales

Product-market Characteristics (Graphics)

	CONCENIB	CONCENPP
CONCENIB	1.00	
CONCENPP	.63**	1.00
COMP6MAD	1.00	
COMPETDS	-.49**	1.00

CONCENIB=Concentration Ratio in Installed Base, CONCENPP=Concentration Ratio for Projected Purchases, COMP6MAD Number of Competitors in Advertisements First Six Months After Entry, COMPETDS=Number of Competitors in Data Sources

Timing of Entry (Graphics)

	TIMINGM	TIMINGE
TIMINGM	1.0000	
TIMINGE	.9975**	1.0000

TIMINGM=Months Since First Entrant, TIMINGE=Number of Entrants Since First Entrant

Magnitude of Distribution Investment (Graphics)

	DIRECT	RETAIL	MAIL
DIRECT	1.00		
RETAIL	-.91**	1.00	
MAIL	-.45	.46**	1.00

DIRECT=Direct Sales, RETAIL=Retail Sales, MAIL=Mailorder Sales

Magnitude of Advertising Investment (Graphics)

	PCM12V	PCM12A	PCW12V	PCW12A	BYT12V	BYT12A
PCM12V	1.00					
PCM12A	.87**	1.00				
PCW12V	.72**	.62**	1.00			
PCW12A	.55**	.66**	.81**	1.00		
BYT12V	.36*	.35	.06	.01	1.00	
BYT12A	.26	.31	.01	.00	.94**	1.0

PCM=PC Magazine, PCW=PC World, BYT=Byte 12= twelve months after entry, V=Volume of Ads (in Pages) A=Number of Ads

Competitive Positioning: Quality and Features (Graphics)

	EC	FEATURES	COPY	HELP	HARDWARE	IMEXPORT
EC	1.00					
FEATURES	.33	1.00				
The following variables were collapsed into 'Features'.						
COPY	.09	.02**	1.00			
HELP	.15	.44*	-.04	1.00		
HARDWARE	.09	.68**	-.18*	.68**	1.00	
IMEXPORT	.28	.48**	.14*	-.06	.10	1.00
FEATURE	.25	.73**	.06	.01	.10	.40*

EC=Editor's Choice, FEATURES=ALL Features, COPY=Copy Protection, HELP=User Friendliness, HARDWARE=Number of Printers, Screen Resolutions, and other output devices, IMEXPORT=Number of Different Types of Formats for Importing and Exiting Files

Competitive Positioning: Pricing (Graphics)

	PRICERET	PRICEOWN	PRICEMAL
PRICERET	1.00		
PRICEOWN	-.05	1.00	
PRICEMAL	.68**	.16	1.00

PRICERET=Relative Manufacturer's Suggested Retail Price, PRICEOWN=Discounted Price, PRICEMAL=Relative Low (Mailorder) Price

Magazine Coverage (Graphics)

	REVVFAV	REVFAV	REVMIX	REVUFAV	CITTOTAL
REVVFAV	1.00				
REVFAV	.38*	1.00			
REVMIX	.39*	.25	1.00		
REVUFAV	-.07	-.09	-.07	1.00	
CITTOTAL	-.35	.53**	.26	-.08	1.00

REVVFAV=Very Favorable Software Reviews, REVFAV=Favorable Software Reviews, REVMIX=Mixed Software Reviews, REVUFAV=Unfavorable Software Reviews, CITTOTAL=Total Number of Other Citations

Performance Measures (Graphics)

	ABII	MCI	MKT SH PP	MKT SH IB	BASE PCPC	CHANGE
ABII	1.00**					
MCI	.58**	1.00**				
MKTSHPP	.58**	.82**	1.00**			
MKTSHIB	.57**	.87**	.98**	1.00**		
BASEPCPC	.59**	.93**	.94**	.97**	1.00**	
CHANGEPC	.59**	.87**	.93**	.91**	.91**	1.00

ABII=Number of Citations in ABI/INFORM, MCI=Number of Citations in Microcomputer Index, MKT SH PP=Market Share Projected Purchases from Software Magazine, MKTSHIB=Market Share Installed Base from Software Magazine, BASEPCPC=WP Personally Used: PC Magazine Survey, CHANGEPC=If Change WP, Change to What: PC Magazine

Table A.5 Descriptive Statistics (Word Processing)

Variable	Mean	Std Dev	Minimum	Maximum
YEARS	5.03	11.34	0	71
OTHER	5.95	3.83	0	10
HUMAN	9171.38	56989.87	0	355947
RESOURCE	884864890	5502035944	0	3.436E+10
CONCENIB	56.52	11.19	0	70
CONCENPP	54.38	11.06	0	66
COMP6MAD	32.44	8.77	5	46
COMPETDS	48.84	54.15	1	158
TIMINGM	24.33	15.03	0	58
TIMINGE	107.93	72.64	1	267
DIRECT	.56	.50	0	1
RETAIL	.49	.51	0	1
MAIL	.49	.51	0	1
SHARE	.92	.27	0	1
PCM6V	.05	.12	.00	.70
PCM6A	.03	.04	.00	.19
PCW6V	.03	.07	.00	.31
PCW6A	.02	.04	.00	.13
BYT6V	.04	.08	.00	.28
BYT6A	.03	.07	.00	.25
EC	.05	.22	0	1
FEATURES	.43	.18	.16	.85
COPY	15.72	23.83	.00	67.00
HELP	.70	.17	.40	1.00
HARDWARE	.24	.24	.00	1.00
IMEXPORT	.59	.35	.00	1.00
FEATURE	.73	.14	.47	1.10
PRICERET	2.21	1.60	.50	7.08
PRICEOWN	1.23	.33	1.00	1.95
PRICEMAL	.41	.27	.08	1.19
REVVFAV	.31	.57	.00	2.00
REVFAV	.87	1.10	.00	4.00
REVMIX	.36	.67	.00	3.00
REVUFAV	.26	.72	.00	3.00
CITTOTAL	2.46	6.66	.00	41.00
ABII	.97	1.98	0	8
MCI	9.23	22.87	0	96
EXPMSM	1.99	4.75	0	18
BASEPCSM	2.30	5.46	0	22
BASEPCPC	2.18	5.58	0	27
BASEPC	3.80	9.76	0	44
CHANGEPC	2.28	7.25	0	35

Number of Valid Observations = 39
Definitions of the variables may be found in the Appendix in the section titled "Correlations Between Manifest Variables and Their Constructs".

Table A.6 Descriptive Statistics (Graphics)

Variable	Mean	Std Dev	Minimum	Maximum
YEARS	5.68	8.17	0	47
HUMAN	1947.91	12349.80	4	82000
RESOURCE	146648759	909898379	0	6.044E+09
CONCENIB	58.81	11.47	0	68
CONCENPP	47.02	13.05	0	68
COMP6MAD	23.64	4.78	16	34
COMPETDS	68.07	42.03	4	135
TIMINGM	26.32	15.28	1	55
TIMINGE	119.04	71.00	8	255
DIRECT	.55	.50	0	1
RETAIL	.50	.51	0	1
MAIL	.41	.50	0	1
PCM12V	.04	.06	.00	.25
PCM12A	.03	.03	.00	.12
PCW12V	.04	.07	.00	.22
PCW12A	.02	.04	.00	.16
BYT12V	.03	.13	.00	.82
BYT12A	.03	.12	.00	.78
EC	.09	.29	0	1
FEATURES	.56	.16	.25	.84
COPY	20.50	17.28	.00	35.70
HELP	.72	.45	.00	3.00
HARDWARE	.45	.34	.00	2.15
IMEXPORT	.43	.27	.00	1.00
FEATURE	.71	.20	.34	1.21
PRICERET	.94	.56	.25	3.20
PRICEOWN	1.25	.34	1.00	2.03
PRICEMAL	.39	.23	.07	1.02
REVVFAV	.27	.59	.00	2.00
REVFAV	.89	1.40	.00	6.00
REVMIX	.18	.39	.00	1.00
REVUFAV	.02	.15	.00	1.00
CITTOTAL	.48	.95	.00	5.00
ABII	.27	.82	0	4
MCI	2.23	4.96	0	24
EXPMSMNX	1.49	6.52	0	41
BASEPCNX	1.50	5.76	0	34
BASEPCPC	1.30	4.22	0	24
CHANGEPC	1.62	5.41	0	34

Number of Valid Observations = 44
Definitions of the variables may be found in the Appendix in the section titled "Correlations Between Manifest Variables and Their Constructs".

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