



National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

THE RELATION OF INTERNAL VS. EXTERNAL STRATEGIES
TO THE PERFORMANCE OF EMERGING ENTREPRENEURIAL
HIGH-TECHNOLOGY FIRMS IN CANADA

A thesis prepared by

Cynthia A. Farrell

in partial fulfilment of
the requirements for the degree of
Master of Business Administration

Ottawa University
Ottawa, Ontario, Canada
July 1994

© 1994, Cynthia A. Farrell



National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395, rue Wellington
Ottawa (Ontario)
K1A 0N4

Your file Votre référence

Our file Notre référence

THE AUTHOR HAS GRANTED AN
IRREVOCABLE NON-EXCLUSIVE
LICENCE ALLOWING THE NATIONAL
LIBRARY OF CANADA TO
REPRODUCE, LOAN, DISTRIBUTE OR
SELL COPIES OF HIS/HER THESIS BY
ANY MEANS AND IN ANY FORM OR
FORMAT, MAKING THIS THESIS
AVAILABLE TO INTERESTED
PERSONS.

L'AUTEUR A ACCORDE UNE LICENCE
IRREVOCABLE ET NON EXCLUSIVE
PERMETTANT A LA BIBLIOTHEQUE
NATIONALE DU CANADA DE
REPRODUIRE, PRETER, DISTRIBUER
OU VENDRE DES COPIES DE SA
THESE DE QUELQUE MANIERE ET
SOUS QUELQUE FORME QUE CE SOIT
POUR METTRE DES EXEMPLAIRES DE
CETTE THESE A LA DISPOSITION DES
PERSONNE INTERESSEES.

THE AUTHOR RETAINS OWNERSHIP
OF THE COPYRIGHT IN HIS/HER
THESIS. NEITHER THE THESIS NOR
SUBSTANTIAL EXTRACTS FROM IT
MAY BE PRINTED OR OTHERWISE
REPRODUCED WITHOUT HIS/HER
PERMISSION.

L'AUTEUR CONSERVE LA PROPRIETE
DU DROIT D'AUTEUR QUI PROTEGE
SA THESE. NI LA THESE NI DES
EXTRAITS SUBSTANTIELS DE CELLE-
CI NE DOIVENT ETRE IMPRIMES OU
AUTREMENT REPRODUITS SANS SON
AUTORISATION.

ISBN 0-612-04985-X

Canada



UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

*"... all development and progress
are fruits of the lights of
virtue, co-operation and concord."*

'Abdu'l-Bahá

ACKNOWLEDGEMENTS

Funds for the survey of Canadian high-technology companies which formed the basis of this study were provided by the Social Sciences and Humanities Research Council of Canada through SSHRC Grant 804-93-0002 to Professors Jérôme Doutriaux and Brigitte Levy in the Faculty of Administration at the University of Ottawa.

This thesis could not have been completed without the assistance and support of many people. I would like to thank, first of all, my advisor Professor Doutriaux who provided the research opportunity and academic support necessary to the completion of such a project. I would also like to thank Professor Tony Quon for his patient assistance.

In addition, I would like to thank my family and friends for their emotional and economic backing. In particular, thanks are due to my parents, Roger and Gloria Farrell for their constant support. Furthermore, this work could not have been completed without the financial backing of several friends in Iceland; 'Asgeir Karlsson and Victoria Pettypiece have lent untiring support as well as another good friend Margo Renner. In the Ottawa area, I would like to thank Ken and Shiva Yan for their support and encouragement during the completion of the thesis.

This thesis is dedicated to the memory of my sister, Julie Virginia Farrell (1958-1990).

TABLE OF CONTENTS

	Page
Acknowledgements	i
Abstract	iv
Introduction	1
Practical Relevance of the Work	2
Chapter One: Background Work and Conceptual Framework	3
1.1 Definition of Terms	
1.2 Review of the Literature	
Performance	
External Strategies	
Stages of Growth: Firm, Industry, Technology	
The High-Technology Sector	
1.3 Conceptual Model	
Chapter Two: Research Hypotheses	18
Chapter Three: Methodology	20
3.1 Survey Instrument and Measurement	
Measurement of Selected Factors:	
Performance	
Firm Stage of Growth	
Arrangement Type and Purpose	
Company Strengths & Weaknesses	
Technological Intensity	
Entrepreneurial Outlook of Management	
Start-up Characteristics	
Other Factors	
3.2 Population	
3.3 Survey Process & Response Rate	
Chapter Four: Analysis of Results	28
4.1 Descriptive Statistics	
4.2 Comparison with BOSS Population	
4.3 Testing of the Research Hypotheses	
Bivariate Analysis	
Multivariate Analysis	

Chapter Five: Summation	63
5.1 Summary of Findings	
5.2 Practical Implications	
5.3 Limits of the Research	
5.4 Conclusions	
References	69
Appendices	74

ABSTRACT

This study compares the growth rates of Canadian high-tech firms that take part in collaborative arrangements with the growth rates of those firms that choose an internal strategy for the realization of firm objectives. Patterns of firm stage of growth and arrangement use are also considered. Finally, arrangement purpose, whether primarily for marketing or technology objectives, is studied.

The analysis is based on a sample size of 50 firms taken from a survey of electronics firms listed in the Business Opportunities and Sourcing System (BOSS) Directory produced by Industry, Science and Technology Canada. The firms chosen for study were of small to medium size, that is with 1992 sales no greater than \$ 50 Million.

Results indicate that medium sized high-tech firms (\$1 Million <'92 sales < \$50 Million) which use collaborative arrangements tend to be smaller and less established, and show a higher rate of growth than those firms that do not use collaborative arrangements. Small firms ('92 sales <= \$1 Million) show little difference in growth rate between those firms using arrangements and those not using arrangements. Early stage firms were found to make greater use of arrangements than late stage firms. Arrangements were made primarily for marketing purposes, and only secondarily for technological purposes. The limitations of the research are largely related to the small size of the survey sample and the fact that the experimental design does not allow for the showing of a cause and effect relationship between external strategies and firm performance.

INTRODUCTION

One of the questions facing the CEOs of Canadian high-tech firms is to decide whether it is better to go it alone, or join forces with others in order to accomplish the firm's goals. This research deals with the issue, of company performance trends in relation to the decision to pursue objectives through an internal strategy or to choose an external option such as a strategic alliance, joint venture or licensing agreement. The study focuses on small and medium sized independent high-tech firms in Canada. This sector and its smaller firms are of special national importance, for as noted in the publication produced by Industry Science and Technology Canada entitled *Small Business in Canada, Competing Through Growth*, "Between 1978 and 1988, firms with fewer than 100 employees were responsible for 81.2 percent of all new jobs created in Canada." (p. 4) In addition, John Shepherd, past chairman of the Science Council of Canada, noted that, "Technology has become the hardest of all trading currencies; it is a major determinant of social change" (*Creating Opportunity*, p.45) Yet despite its efforts in this sector, Canada is currently operating at a deficit in high-technology; more technology is imported than is created nationally. Finally, it is interesting to note in this context, that in 1991 E.B. Roberts in his work *Entrepreneurs in High Technology*, commented on the fact that "the strategic aspects of high-technology companies are perhaps the least developed area of academic entrepreneurship research." (p. 309)

This report begins with a summary of current knowledge in the field of high-tech entrepreneurial research. Then the specific factors chosen for closer study are isolated, and the research hypotheses described. Next, the research methods are outlined and the population under study is described. A statistical analysis follows, using the appropriate

statistical procedures. Finally, the results are summarized in the study's concluding section.

PRACTICAL RELEVANCE OF THE WORK

The relevance of research into small and medium sized firms is given perspective by the following quotation from The Economist (1993):

New technology has spread around the world, trade barriers have come down, financial markets have been deregulated and consumer tastes have converged across borders. All these changes were once expected to give big firms even more scope to flex their muscles. Instead they have granted business opportunities to thousands of small and medium-sized companies, and shown the bodies of many corporate behemoths to be mostly flab.

The question which naturally arises from this quotation is how small and medium sized firms can best take advantage of these new opportunities. Indeed, in this respect, the strengths of external strategies are supported by researchers such as Hamilton and Singh (Hamilton & Singh, 1992) who write, "investing in external modes of growth (alliances, contracts, and minority investments) to access complementary assets is particularly important to firms that face a strategic imperative to create options." Yet McCann found (McCann, 1991) that the high-tech firms with the highest performance levels chose internal strategies in pursuit of technology breakthroughs. Thus, the basic question underlying this research is to determine if, within the context of the new business realities, better performance results when firms hone their core competencies and then seek external alliances to complement these core competencies.

CHAPTER ONE: BACKGROUND WORK AND CONCEPTUAL FRAMEWORK

1.1 Definition of Terms

The purpose of this research is to determine if there is a relationship between the choice of an internal versus an external strategy by emerging Canadian entrepreneurial high technology firms and their subsequent level of performance. In particular, the choice of external as opposed to internal strategies in the pursuit of greater competence in research and development, commercialization of new products, manufacturing and finance will be considered. The term "emerging" in this study is taken to mean a firm that has moved beyond the start-up stage.

There is no consensus in the literature as to what an "external strategy" is; terms commonly used include strategic alliance, collaborative agreement or collaborative arrangement. Auster (Auster, 1990) in her study defines such arrangements in terms of the amount of equity investment involved, ranging from no investment (for example a licensing agreement) to a high level of equity investment (for example direct investment consisting of 100% ownership on foreign soil). In another study, Forrest (Forrest, 1990) outlines a full range of cooperative arrangements. She defines a strategic alliance to include a joint venture, equity investment, marketing and distribution agreement, manufacturing agreement, licensing agreement and R&D agreements. But she goes on to write, "SA [strategic alliance] does not cover agreements involving full ownership such as mergers, acquisitions, or internal ventures". Finally, Georges Fernandez (Fernandez 1993) in his study "Strategic Alliances" provides a review of definitions from recent publications. In his work a strategic alliance is defined as an agreement between two or more firms that affects the core activities of the firm, rather than being of peripheral importance.

For the purposes of this research, external strategies are given the terminology "collaborative arrangement" and are defined as follows:

A formal or informal agreement between two or more firms to perform or develop certain functional activities; however, each firm retains its separate legal status. For example, collaborative arrangements include joint ventures, licensing agreements and strategic alliances. They do not include mergers, acquisitions or contract work.

A particular effort was made to avoid using the term "strategic alliance" in this study because this expression has come to mean different things to different people. Thus, this wording was only used in a footnote on the first page of the questionnaire as an example of a potential type of collaborative arrangement.

An internal strategy is considered to be any company strategy in pursuit of marketing, technological, financial or manufacturing objectives which is accomplished "in-house", that is without collaboration with a partner firm. Suppliers are not included in the concept of external strategies; monetary contracts (i.e. contract work) are also excluded from the external strategy category because they are performed with the financial resources of the firm and are under its control, and according to its specifications.

Within this current research the concept of collaborative arrangement has been defined so as to include all forms of cooperation but to exclude arrangements which involve little cooperation but are simply an outright purchase so that the identity of one firm is submerged in the authority of the purchaser. Such an arrangement is no longer that of independent cooperation, but rather a hierarchical structure.

1.2 Review of the Literature

A number of articles dealing with broader aspects related to the formation of collaborative arrangements were reviewed and tabulated according to the factors they studied, making for a total of 47 studies. This broad review of the literature fell into several thematic groups. The first group, performance, deals with those factors that improve firm performance as well as the measurement of performance. The second group, external strategies, covers any form of cooperative agreement or arrangement between firms. The third group, stage of growth, deals with patterns of evolutionary development within a firm, product group or industry. The final group, high-tech characteristics, looks at those factors which are particular to high-technology companies. The breakdown of thematic groupings is as follows:

<u>Theme</u>	<u>Number of Studies on the Topic</u>
Performance	20
External Strategies	24
Stage of Growth in firm/industry	13
High-Tech Characteristics	30

Table 1 gives a list of each study and its themes, and then a review of each of these themes follows below.

Table 1 Study Topics

AUTHOR'S NAME	DATE	PERFORMANCE	EXTERNAL	STAGE	HIGH-TECH
Christensen	1989	(entrepreneurial)			
Hamilton & S.	1992		X	X	X
Hughes	1990			X	X
McCann	1991	X	X	X	X
McDougal & O.	1992	X			X
Mugler & Mie.	1989	(exports)			
Cardozo, et al.	1993	X			
Steen	1990	X	X		
Mosakowski	1991	X	X		X
Vink-Ellis	1991		X		X
Sherman	1992		X		
Hagedoorn	1990		X		X
Ryans	1984				X
Stewart	1993		X		
Sexton	1988			X	X
Dodge & R.	1992			X	
Tyebjee	1990	X			X
Alonso et.al	1993	X			X
Stuart & L.	1988	X			X
Lehrer	1993				X
McDougal et. al	1992	X			
Gartner & T.	1992				X
Vink-Ellis	1989		X	X	X
Keeley & K.	1993		X		X
Larson	1991		X		
Ragab	1992	(entrepreneurial)			
Teach et. al	1991	X			X

McDougal & R.	1980	X			X
Auster	1990		X	X	
Farok & L.	1988		X		
Doutriaux	1992	X			X
Doz	1988		X		
Forrest	1990		X		X
Hanks & Ch.	1991			X	X
Hull et. al	1988		X		X
Doutriaux	1993	X	X		X
McGee	1993	X	X		X
Pegg et. al	1992		X		
Shan	1990		X	X	X
Scott & Br.	1987			X	
Buckley & C.	1988		X		
Slowinski	1992		X		
Gugler	1992		X		X
Harrigan	1988		X		X
Kazanjian	1988	X		X	X
Kazanjian & D.	1989	X		X	X
Roberts	1991	X		X	X

Performance

Only one study has been located which combines all of the elements considered in this research, that is the use of external strategies (in this study strategic alliances) by high-tech companies in different stages of growth and their relation to subsequent performance. Only McCann (McCann, 1991) deals specifically with all of these elements, but in his case only companies in the southern U.S. are studied, whereas this current research is looking at Canadian high-tech companies.

McCann looks for patterns of growth, technological development, and financial choice. Furthermore, he looks for factors that shape or determine which choices are taken, and finally, he considers whether these patterns are related to the firm's level of performance. Some of the factors considered are growth rate, scope of sales (local/regional vs. national/international), industry stage of growth and firm stage of growth. His study found that firms showing high performance levels were pursuing internal technical development breakthrough strategies. "Only the Internal Business Venturing Strategy [for technological development] was significantly related to the venture's growth rate. There is no significant interaction effect between development stage and strategy choice." McCann did not look at non-technical strategies (with the exception of financial strategy), nor did he allow for a time lag between the implementation of a given internal or external strategy and the subsequent measurement of the resulting performance.

An interesting comparison to the literature on alliances is found in Wheelen and Hunger's analysis of the effect of acquisitions on company performance. Wheelen and Hunger write in regards to acquisitions (Wheelen and Hunger, 1992), "There is evidence that acquiring firms tend not to do as well in terms of profits as they did before the acquisition." The question that arises is whether external alliances will differ in this respect from acquisitions, such that a positive relationship to firm performance can be identified. Another item of relevance found in the literature is in regards to the measurement of performance; Mosakowski (Mosakowski, 1991) recommends a two year performance time differential in high technology industries as being consistent with the rate of change experienced in this industry. A third point of relevance to this research was that made by Shan (Shan 1990) as to the need for longitudinal research on firm performance and cooperative arrangements, he

writes that it would be "interesting to know, empirically, how cooperative arrangements actually impact upon the performance of the partners in terms of changes over time in their competitive position."

External Strategies

Hamilton & Singh in their 1992 study write, "The principal benefit they [firms] can obtain by using the external growth option is time: by creating complementary resources internally, firms can lose the initiative to a rival firm that uses external modes of growth to access complementary resources."

Another similar line of thinking is expressed by Slowinski (Slowinski, 1992) who writes, "Certainly, the rapid growth in strategic alliances demonstrates their utility in dealing with the increasingly complex economic issues of recent years." The differences between those firms who tend to seek cooperative arrangements and those who do not exhibit such a tendency is found by Shan (Shan 1990) to lie in differences between their relative strength and competitive security, "...the propensity to cooperate is positively correlated with the distance of firms' competitive position in relation to their rivals. The follower is more likely to seek cooperative relationships than the leader in commercializing new products. ...We found that firm size is negatively correlated with the use of cooperative arrangements."

The type and purpose of the cooperative arrangements formed is discussed in the study "Patterns of International Coalition Activity" (Ghemawat, Porter, Rawlinson 1986). This study is not limited to the high-technology industry but looks at all arrangements recorded by *The Wall Street Journal* between 1970 and 1982. They found arrangement types to be

grouped as follows:

Joint Ventures	41%
Licenses	16%
Supply Agreements	12%
Other Agreements	31%

The purpose of the arrangements was organized into four categories with the following results:

Technology Development	20%
Operations & Logistics	42%
Marketing, Sales & Service	22%
Multiple Value Activities	16%

Other findings reported in their study and relevant to this research are outlined in the following quotation, "...a more detailed study of coalitions in manufacturing industries suggests that it is not simply the relative costliness of activities that determines coalition incidence. ...Marketing, sales and service coalitions are evidently driven by the need for access as much as by the size of marketing cost." A second point from their study concerns the incidence of collaborative arrangements in firms with high levels of R&D activity. "R&D intensity is significantly higher in industries marked by technology-development coalitions, ...suggesting that R&D intensity is associated with a high incidence of all types of coalitions."

Stages of Growth Within the Firm, Industry or Technology

One line of questioning which has attracted the attention of many researchers is the relationship between a firm's stage of growth and the propensity to seek arrangements. Kazanjian (Kazanjian, 1988) identifies four stages of growth, that are related to certain key

problems faced by firms at different stages in their evolution. It is assumed that firms will logically seek external alliances in order to compensate for a weakness which prevents them from improving performance. Different evolutionary stages will translate into different internal weaknesses and therefore different patterns of external alliance formation.

Hamilton & Singh (Hamilton & Singh, 1992) also consider stages of growth, in the case of their study, the technological life cycle. They find that strategic choices in emerging fields evolve over time. In the early stages, which are characterised by a high degree of technological and market uncertainty, companies will exhibit a high propensity for external collaboration in order to reduce risk exposure and the time required to bring a new technology to market. As the level of uncertainty declines over time, the propensity to seek external alliances also declines. It is noted, however, that the Hamilton & Singh study is specifically concerned with the biotechnology industry, which operates under different constraints than the electronics industry considered in this current research.

A third study that deals with stages of growth and the choice of strategy is that of Shan (1990). Shan considers the strategy of biotechnology firms, looking at their propensity to form cooperative relationships in order to commercialize products. In general, he found that collaborative arrangements are sought as a short cut through the technology life cycle. "The further behind the firm is in competition with its rivals, the more likely it is to commercialize a new biotechnology product through a cooperative arrangement." As mentioned earlier, Shan raises a question for future research as to the connection of cooperative arrangements with performance over time. This question is addressed in the current research.

A study of industry life cycle and the form of resource investment predicted is found in

the work of Auster (1990). Different forms of cooperative agreements, ranging from no or low resource investments, such as research and development agreements and licensing agreements, to high resource investments such as joint ventures, and direct investment, were considered. A pattern emerged that linked the stage of industry evolution, either emerging, growing, maturing or declining, and the propensity to choose certain strategic options in regards to collaborative relationships. The study focused on U.S. / Japan collaborations and looked at several different industries as representing different stages of industrial growth.

High Technology

The studies reviewed covered the high technology industry to a large extent though some studies such as that by Auster (Auster 1990) compared several different industries (steel, automobile, biotechnology, communications, etc.). As a subset within the high-tech group, there are several studies dealing specifically with the biotechnology industry, for example, Hamilton & Singh (1992) as well as W. Shan (1990). The characteristics particularly evident in the high-tech industry, and discussed in the literature, are the high costs and risks related to research and development, as well as the extremely rapid product life cycle. Products move from being innovative to obsolete in a very short time compared to other industries (Mosakowski, 1991). It was the element of timing and the high risk emphasised in the literature that were considered relevant to this research on the high-tech industry of Canada.

1.3 Conceptual Model

The review of the literature given in the previous section covered some of the factors which are thought to have, or have been observed to have, an effect on strategy selection and performance.

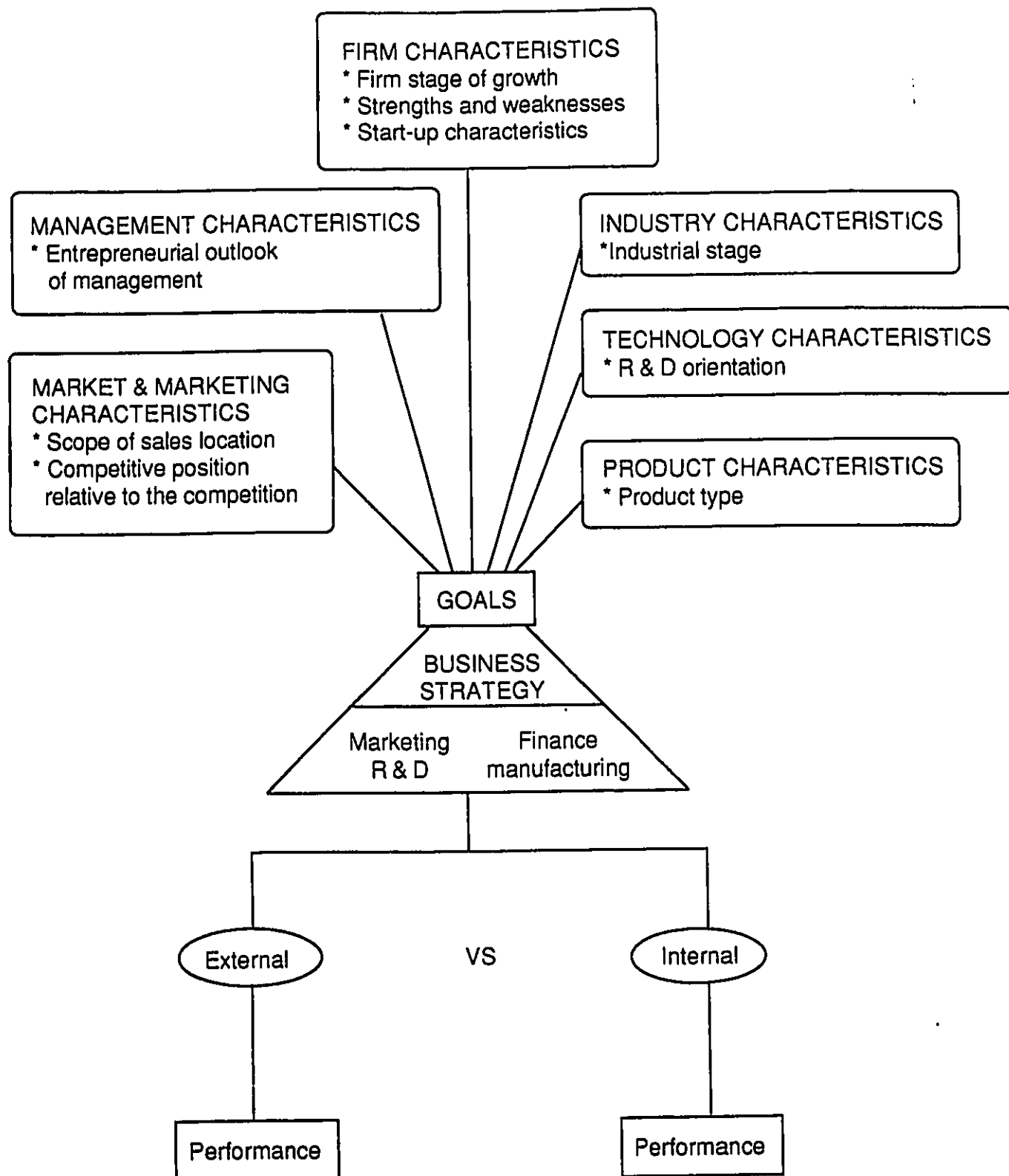
The interplay of these and other factors involved in the choice of internal versus external strategies in marketing, technology, manufacturing and finance, and the resultant performance level achieved by the firm can be summarized graphically in the following conceptual model (Figure 1) which is built on the six categories found in Table 2 (see Table 2 at the end of this section). The model starts with the factors found in the literature which are seen to influence the choice of internal or external strategies and the firm's eventual performance. These factors have been divided into six major categories:

- 1) Firm characteristics
- 2) Management characteristics
- 3) Market and Marketing characteristics
- 4) Industry characteristics
- 5) Technology characteristics
- 6) Product characteristics

The numbers given in parenthesis in Table 2 correspond to specific studies listed on the key to Table 2. These factors are thought to influence what kind of strategic approach will be taken by the firm in regards to achieving its goals in marketing, technological development, financial matters, and manufacturing. Either an external or internal approach is chosen, and a given performance results. The research in question seeks to answer whether an external alliance leads to better performance than an internal strategy. From the many factors listed

Figure 1

CONCEPTUAL MODEL



on Table 2, the following elements were chosen for specific study within this research:

- * firm stage of growth
- * entrepreneurial outlook of management
- * industry stage
- * product type
- * competitive position relative to the competition
- * strengths and weaknesses of the firm (microissues)
- * R&D orientation (technology intensive firm)
- * scope of sales location
- * start-up characteristics (age and size)

Firm stage of growth, company strengths and weaknesses (microissues), and start-up characteristics (age, size), were chosen to represent firm characteristics. Management characteristics is represented by the degree of entrepreneurial outlook of management. Market and marketing characteristics are represented by the scope of sales location and the relative competitive position of the firm. Industry characteristics are represented by the measurement of industry stage. Technology characteristics are represented by the measurement of R&D as a percentage of sales which in turn represents the technological or R&D intensity of the firm.

These factors were chosen from amongst the many discussed in the literature as, taken together, they represented the full spectrum of the six major categories indicated in Table 2. Furthermore, the selected factors were either of particular interest to the researcher in that they were thought likely to show predictive patterns or they were a topic of discussion predominant in the literature.

Table 2 Conceptual Model Characteristics

1 FIRM CHARACTERISTICS stage of growth(2) age(2) size(6) ownership(2) number of businesses in firm(2) uses backward integration(8) uses forward integration(8) microissues(10) more formal organization(17) size relative to partner(19) lack of financial resources(10, 21)	2 MANAGEMENT CHARACTERISTICS think volume & network(7) entrepreneurial outlook(8) market oriented(8) degree of opportunity identification(9) decentralized opportunity identification(9) propensity for growth of CEO(11) experience level(20)
3 MARKET & MARKETING POSITION CHARACTERISTICS scope of sales(2, 6) scope of competitors' sales(2) competitive position relative to competition(5) early market focus(7) early dedicated marketing personnel(8) needs access to markets(10) market globalization(14)(15) use of sales contracts(12) use of service contracts(12) uncertain environment(13) less sophisticated customers(13) market access structure(21)	4 INDUSTRY CHARACTERISTICS industry stage(2, 3, 16) choice of industry(2) demand traits vs. competitors' traits(13) industry structure(18) [Table 2 continued next page]

5 TECHNOLOGY CHARACTERISTICS technology intensive firm(1) technology stage or life cycle(1,2,5) level of techn. uncertainty(4) rate of growth in techn. env.(10) degree techn. convergence(14) monitor techn. mkt. entry(21) high cost/risk technology(21) techn. complementarity with other firm(21) reduce innovation time span(21) rising cost of R&D(14) need for techn. expertise(10) use of R&D contracts(12)	6 PRODUCT CHARACTERISTICS product type(2) product diversity(6) product life cycle reduction(14)
---	--

KEY TO TABLE 2

1. Vink-Ellis (1989)
2. McCann (1991)
3. Auster (1990)
4. Hamilton & Singh (1992)
5. Shan (1990)
6. Keeley & Knapp (1993)
7. Steen (1990)
8. Roberts (1991)
9. Christensen (1989)
10. Stewart (1993)
11. Sexton (1988)
12. Mosakowski (1991)
13. Harrigan (1988)
14. Gugler (1992)
15. Slowinski (1992)
16. McDougal et al. (1992)
17. Stuart (1988)
18. McDougal & Robinson (1988)
19. Pegg (1992)
20. McGee (1993)
21. Hagedoorn (1990)

CHAPTER TWO: RESEARCH HYPOTHESES

The emerging entrepreneurial high-tech firm is strong in technology but perhaps weak in marketing, finance and international experience or exposure (Roberts 1991). As long as the entrepreneurial instinct is strong within the management team, these firms can be expected to prefer independent action in their field of expertise, that is technical innovation, but would be attracted to cooperative arrangements in other fields of expertise, such as marketing. Furthermore, firms will logically seek external alliances in order to compensate for a weakness which prevents them from improving relative competitive position and performance. Through the use of collaborative arrangements it is intended that the weakness can be compensated for and a higher growth rate achieved. Based on these perspectives which were drawn from the literature review, and the relationships illustrated in the conceptual model, a formal statement of the research hypotheses follows:

Hypothesis 1: Entrepreneurial high-tech firms that form collaborative arrangements will exhibit stronger economic performance (performance being measured as rate of growth in sales).

Hypothesis 2: Arrangements will be most attractive to firms in their early stages of development, and less attractive to mature firms with a secure competitive position.

Hypothesis 3: Entrepreneurial high-tech firms will be more likely to seek arrangements for marketing purposes as opposed to for technology related purposes, their area of particular competency.

Within this research, and as stated in Hypothesis 1, it is expected that firms which seek external arrangements will perform better than those firms that do not seek arrangements. This question is the subject of the title of this work and forms the primary focus of the thesis. Though the literature in general considers arrangements to be important to firm growth there is no compelling evidence to prove it. In fact, as mentioned earlier, McCann (McCann, 1991) found that those firms showing the highest performance were seeking internal means of technological development. However, his study, as mentioned, was limited to firms in the southern U.S. whereas this current study focuses on Canadian high-tech firms.

In Hypothesis 2, the pattern of arrangement formation is expected to show that firms are more likely to form a collaborative arrangement in the early stages of firm development. A number of studies looked at patterns of arrangement formation in relation to industry or technology life cycle (Auster 1990, Hamilton & Singh 1992, Shan 1990) but only McCann studies the firm life cycle in relation to arrangement formation. He found no relation between collaborative arrangement formation and firm stage of growth.

In Hypothesis 3, which concerns the purpose of the arrangements formed, whether for marketing and distribution or for technological purposes, it is expected that firms will be looking for marketing arrangements primarily. This expectation is based on the work of E.B. Roberts (Roberts 1991); he describes the entrepreneurial high-tech firm as being weaker in marketing than in any other functional area, thus it is assumed that they will seek alliances to compensate for this weakness.

CHAPTER THREE: METHODOLOGY

This section of the study will describe the process whereby data was collected so as to be able to test the hypotheses given above. This research is based on a mail survey conducted in Canada. The specific survey instrument, a questionnaire, is described below and provided in appendix 1. The factors selected for study in the conceptual model section were incorporated into questions for measurement. The measurement process is described below as well. The data collected by the survey was subsequently analyzed using the appropriate statistical techniques. The methodology section opens with a description of the survey instrument and measurement methods, followed by a description of the study population, and then concludes with a section on the survey process itself.

3.1 Survey Instrument & Measurement

The survey instrument, a questionnaire, and an accompanying cover letter were developed and presented to the University Ethics Committee for approval. Also included in the mail-out was a one page summary of the research objectives which included an outline of the preliminary results found in a pilot survey conducted in 1993. The pilot survey consisted of a phone interview with 27 companies as part of a follow-up on a 1986 survey of 72 Canadian high-tech firms.

All mail-out materials were prepared in both French (for Quebec firms) and English (for the firms in the rest of Canada). A copy of the material in English was sent to those Quebec firms which requested an English version. The questionnaire was first pilot tested, and

subsequently shortened in length so as to make completion time approximately 30 minutes.

These materials (see appendix 1) were subsequently sent to the CEO's of the electronics firms which composed the study population.

The measurement of factors covered within the conceptual model are described below as they were incorporated into the survey instrument.

Measurement of Performance

Longitudinal firm performance was measured both objectively and subjectively. The objective performance measure consisted of a section on the questionnaire which asked the respondent to give company sales levels (in thousands of dollars) in 1985-1986, in 1989-1990, and in 1992-1993 (see question 7.1 & 7.2 on the questionnaire) as well as employee levels. The questionnaire also gave the option of reporting sales ratios. Sales levels were used as a measurement of company size as well in calculations of performance levels.

A subjective measurement of performance was provided by question 9. Respondents were asked to assess their firm's performance for each time period on a six level scale ranging from (1) Very Poor to (6) Excellent. In addition to general firm performance, respondents were asked to rate the effect of any collaborative arrangements on the firm's performance within three areas, impact on sales level, impact on competitive position, and impact on technological competency (see question 3, Impact of Collaborative Arrangement).

Performance as per Hypothesis 1 could then be calculated for each firm as represented by the rate of growth over the time period 1985 -1992, or 1985-1989 and then 1989-1992.

This method of measurement for performance was considered the most reasonable alternative given the need to balance ease of use for the respondent with a certain reluctance to reveal information which is not generally public knowledge. Other studies used related methods (McCann 1991) (McGee 1993). McCann categorized performance as follows:

High	annual compounded growth of 50% or higher
Average	growth of between 10 and 50%
Low	annual growth of less than 10%.

whereas McGee calculated average sales growth as equal to $[(\text{Sales}_3/\text{Sales}_1)^{1/3} - 1] \times 100$. Finally, Brush & VanderWerf did a study on performance measurements currently in use (Brush & VanderWerf, 1990) and found "... [a] review of current empirical studies measuring some aspect of performance found there were more than 35 different measures of performance used. the most popular being sales, growth in sales, and changes or increases in number of employees." Thus the performance measurements used in this research are entirely consistent with that found in the literature.

Measurement of Firm Stage of Growth

A longitudinal pattern of company stage of growth was measured by question 6. Respondents were asked to check the description which best matched their firm in 1985-1986, in 1988-1989, and in 1992-1993. Five descriptions were given as well as one option for "other". The descriptions are closely based on those given by Kazanjian in his survey of company growth stages (Kazanjian 1988).

Measurement of Arrangement Type and Purpose

Arrangement type was measured by giving respondents a choice of four types plus one section for "other" in which they could fill in another type of arrangement. Respondents were asked to check only one type, thus it is assumed that they chose the alternative which best applied to their situation. Arrangements were typed as either a joint venture, a formal partnering agreement, an informal partnering agreement, a licensing agreement, or in the "other" category. Here, respondents could specify the type of arrangement if they checked the "other" category. This measurement is somewhat similar to that used by Ghemawat, Porter and Rawlinson in their 1986 study where joint venture, licenses and "other" are specified, but their classification differed in that they specified supply agreements as well.

The measurement of arrangement purpose is found in question 3. Fourteen choices are given, but these choices actually compose four main categories, Marketing & Distribution (choices 1-6 and 13), Technology (choices 7-10), Finance (choice 11), and Manufacturing (choice 12). Respondents were asked to check one type and purpose for each arrangement which the company entered into between 1985 and 1993. Space was provided for five arrangements but firms were asked to attach a response for any additional arrangements.

Measurement of Company Strengths & Weaknesses

As a measurement of company strengths and weaknesses, respondents were asked to rate their firm's expertise in the following areas: technology, R&D, marketing, finance, distribution, manufacturing, international experience. For each category the respondent was asked to rate that factor as either strong (S) or weak (W).

Measurement of Technological Intensity

The level of R&D intensity was measured in question 10 by asking for R&D expenditures as a percentage of sales in 1985-1986, in 1989-1990, and in 1992-1993. Question 10 also asks for the number of R&D employees as a percentage of total employees.

Measurement of the Entrepreneurial Outlook of Management

Respondents are asked to rank their firm's management style on a scale of one to ten with one representing an entrepreneurial outlook and 10 representing a team management approach. An entrepreneurial outlook was defined as "the president/entrepreneur is central to all functions, communications and decisions"; the team approach was defined as "firm is led by a top management team of individuals with broad delegation of decision making." The question is loosely based on the work of Christensen, et alii, in their 1989 study "Opportunity Identification: The Contribution of Entrepreneurship to Strategic Management".

Measurement of Start-up Characteristics

The last page of the questionnaire includes a section on start-up characteristics. Age is measured by requesting start-up year. The type of company creation is requested, asking whether the firm is an independent firm or a dependent company such as a division, subsidiary or joint venture. The respondent is asked if the firm went public and if so in which year. Start-up sales and the R&D to sales ratio based on an average of the first and second year sales are also requested. This section builds on the work of Doutriaux which looks at the influence of company start-up characteristics on the subsequent performance of high-tech firms (Doutriaux, 1991, 1992).

Measurement of Other Factors

The other factors that are monitored in this research as to their effect on company strategy selection and subsequent performance are industry stage, product type, scope of sales location and relative competitive position. These factors are measured in questions 15, 13, 8, and 16 respectively. The factors are taken from discussions arising in the literature as can be seen in Table 1; in particular they arise from the work of McCann and Shan.

3.2 Population

A population of Canadian high technology firms was identified. The population chosen was the firms listed in the 1993 BOSS (Business Opportunities and Sourcing System) Directory produced by Industry, Science and Technology Canada (for sample listing see appendix 2). Access to the database is available on-line to the public. From this data base a mailing list was composed giving the name of the company chief executive officer, the name of the company and address. The data base also gives further descriptive statistics on each firm such as sales level, export activity levels, existence of R&D department, etc. The complete listing of manufacturing electronics companies was selected giving a base of 1009 firms. This population is representative of high-tech firms as per a definition of high-tech according to product type, that is a product that is built on "inventions or innovations from applied science or engineering research" (p. 71),(Berkowitz, et al. 1991).

Other options for population choice were considered. They included a listing of Canadian

high-tech firms from Hutchison Research Partnership entitled CANTECH National Directory which is available in the 1991 version in reference book format or with a more current data bank listing available on diskette. Dun & Bradstreet offer a data base search of Canadian high-tech firms. Several other trade directories are also available. It was decided to use the BOSS data base as it appeared to be sufficient for the purposes of this study and was easy to access. It was also provided free at the time of this writing, though there was discussion that a fee would be charged in the future.

3.3 Survey Process and Response Rate

The survey package mail-out was conducted the last week of January 1994 and the first week of February. Data collection began in early February as some questionnaires arrived back almost immediately by facsimile. A log was initiated recording the date of questionnaire arrival, company ID number (assigned in order of questionnaire arrival) company location if indicated, and whether or not a summary of the research results was requested. A follow-up communication by facsimile (Fax) to improve the response rate was initiated the first week of March. The follow-up consisted of a one page Fax sent to all members of the population who had not replied giving their company name. A follow-up was not sent to those companies which had already replied or to the addresses on the 18 envelopes which were returned by the postal system with no forwarding address. A total of 95 companies responded. Approximately two thirds of the replies came in as a result of the first mailing, and then the last one third came in as a result of the facsimile follow-up.

The questionnaire was encoded for data entry with the creation of 204 variables. The data was entered into a Quatro Pro Spreadsheet format. Each company was listed as well as data on each arrangement for those companies that had arrangements. Once data entry was complete, the files were converted into ASCII format for use with the statistical package Stata 3.1.

The questionnaire response rate was considerably lower than that experienced with similar surveys in previous years. The response rate was approximately 10% as opposed to a 30% rate which is more common. For example, Kanuk and Berenson (Kanuk & Berenson 1975) in their study reported a response rate for a survey of this type (sent to organizations) with no follow-up contact, of between 23% and 30%. Possible reasons for this low survey response rate are as follows:

Firstly, the survey was fairly complicated and required the attention of the CEO, or other fairly senior member of the organization, who had a comprehensive knowledge of the firm.

Secondly, firms may be receiving more requests for filling out questionnaires; in fact, one firm wrote back to say that they were receiving so many questionnaires that they could only respond to a fraction of all the requests they received, and thus they had to decline.

CHAPTER FOUR: ANALYSIS OF RESULTS

4.1 Descriptive Statistics

As it is the goal of this research to study independent high-tech firms in the small to medium size range the study population was delimited so as to include only those firms from the sample which were created as independent, entrepreneurial firms. In addition, those firms with 1992 sales above \$50 million were dropped to have a sample more homogenous and more representative of small and medium sized firms. By including only independent firms 12 firms from the sample were deleted. Ten firms were deleted as they had sales in excess of \$50 million in 1992. In addition, a firm with start-up year 1904 was deleted as it was significantly older than the other firms and not seen to be representative. These deletions left a group of 72 firms within the study population. Furthermore, as the goal of this research was to measure longitudinal performance; as the analysis progressed, it was decided that only firms giving sales figures for the full time period being measured (1985-1993) be included. Twenty-two other firms were then dropped as they had missing values for the sales variables; thus a sample of 50 firms was left within the longitudinal study.

The sample of 95 firms was originally analyzed to tabulate and summarize the questionnaire results. That sample resulted in the following descriptive statistics as shown in Table 3 below, a comparison is also provided for the sample of 72 firms and the sample of 50 firms. The statistics are very similar except for mean sales which is considerably higher for the group of 95 as this group included firms with sales of more than \$50 Million.

Table 3 Descriptive Statistics

CATEGORIES	95 RESPONDENTS	72 FIRMS	50 FIRMS
Mean Start-up Year	1975	1978	1975
Mean Age	19	16	19
Mean Sales (\$ 000)			
Year 1985	5,084	2,598	2598
1989	4,895	2,731	3186
1992	9,356	3,739	4325
Mean Stage of Growth			
Year 1985	2	1.72	1.73
1989	2.6	2.43	2.59
1992	3.7	3.63	3.94
Product Type 1993	%	%	%
Software	19	18	19
Electronic hardware	39	38	35
Telecommunications	14	15	12
System design	19	21	26
Other	9	8	9
Start-up Type			
Independent	88%	100%	100%
Division	4%	-	-
Subsidiary	4%	-	-
Joint Venture	4%	-	-
Industry Stage of Growth (1993)			
Emerging	7%	8%	4%
Growing	60%	65%	68%
Mature	24%	17%	16%
Declining	9%	10%	12%

CATEGORIES	95 RESPONDENTS	72 FIRMS	50 FIRMS
# of Firms that went public	7	6	3
Firms with Collaborative Arrangements	70%	65%	66%
Firms w/o Collaborative Arrangements	30%	35%	34%
Firm Location	%	%	%
Ontario	49	48	51
Quebec	21	22	21
British Columbia	11	11	11
Atlantic Provinces	8	7	8
Prairies	11	12	9
Type of Arrangement			
Joint Venture	17%	14%	17%
Formal Partnering Agreement	19%	21%	20%
Informal Partnering Agreement	27%	24%	19%
Licensing Agreement	29%	31%	34%
Other	8%	10%	10%

CATEGORIES	95 RESPONDENTS	72 FIRMS	50 FIRMS
Arrangement Purpose			
Mkt. & Distribution	55%	57%	65%
Technology	32%	31%	23%
Finance	6%	6%	5%
Manufacturing	5%	5%	5%
Other	2%	1%	2%

Next, a breakdown of growth rates by type of arrangement for early/late stage firms and for firm size is shown in Table 4. The significant difference of interest is that between the growth rate of early and late stage firms which entered into joint ventures. The late stage firms are actually showing a negative growth rate, but there is a much smaller percentage of arrangements in the joint venture category for the late stage firms. This low level of participation by mature firms could be due to poor experience in the past with joint ventures.

Table 4 Growth Rate By Type of Arrangement for Early/Late Stage and for Small/Medium Size Firms

TYPE OF ARRANGEM.	STAGE				SIZE			
	Early		Late		Small		Medium	
	%	R	%	R	%	R	%	R
Joint Ven.	17	1.07*	8	-.143*	15	.5591	11	1.159
Formal	22	2.964	19	.3693	17	.5837	25	3.616
Informal	25	1.586	22	.7907	23	1.948	25	.9792
Licensing	29	.8681	35	.7145	31	.7295	32	.8779
Other	7	2.42*	16	.229*	14	1.52*	7	.125*

(Based on the group of 72 firms)

% - Indicates percentage of arrangements in the category

R - Indicates the growth rate of the category

* - Indicates a significant difference

Note: For this analysis, small and medium size was delineated as small being of sales less than the median value for 1992 sales, and medium as greater than or equal to median sales, (\$1.65 Million).

4.2 Comparison of Sample with Boss Population

Several descriptive statistics were selected upon which to compare the similarity of the questionnaire sample with the BOSS population. The median sales levels were compared as well as age and geographical distribution by province. The sample seemed quite similar to the BOSS population. The comparative statistics are as follows:

	<u>Sample</u>	<u>Population</u>
Median Sales 1992	\$ 2.5 Million	\$ 2 Million
Geographical Distribution	49% Ontario	50.88% Ontario
	21% Quebec	17.92% Quebec
	11% B. C.	13.90% B. C.
	8% Atlantic Pr.	3.30% Atlantic Pr.
	11% Prairies	14.01% Prairies

4.3 Testing of the Research Hypotheses

Bivariate Analysis

Hypothesis One states that emerging high-tech firms which form alliances will exhibit stronger economic performance (performance being measured as rate of growth in sales). This hypothesis was tested by first comparing mean sales and median sales levels for firms with and without arrangements within the group of 72 firms. Next the same sales levels were compared for the group of 50 firms. The different groups were compared for significant differences in regards to the factors listed in the conceptual model as well. A more detailed analysis was then completed on the data for growth rate in the early 90's, identifying outliers and recalculating significances if the outlying observations were dropped.

Sales growth values were generated for those firms that had collaborative arrangements and for those that did not have arrangements according to the following formulas:

$$\text{Full Longitudinal Rate of Growth} = (\text{Sales}_{92} - \text{Sales}_{85}) / \text{Sales}_{85}$$

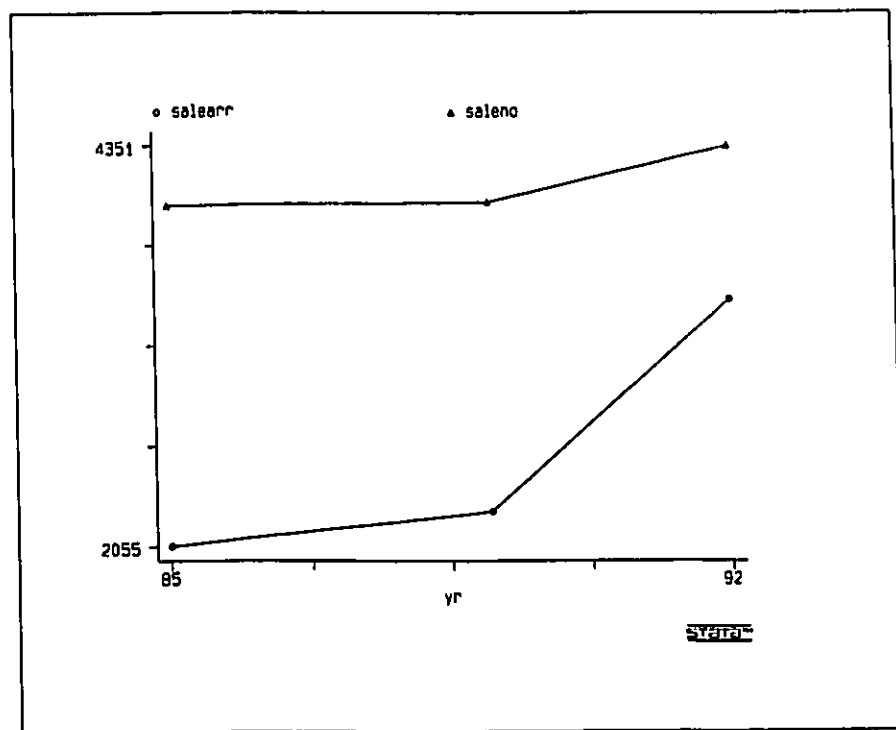
$$\text{Period Rate of Growth(90s)} = (\text{Sales}_{92} - \text{Sales}_{89}) / \text{Sales}_{89}$$

$$\text{Period Rate of Growth(late 80s)} = (\text{Sales}_{89} - \text{Sales}_{85}) / \text{Sales}_{85}$$

The analysis opened with a plotting of mean sales values for all firms with arrangements and for all firms without arrangements. There were more firms included in the sales figures for the later measurement periods, such that the group sizes seen at the bottom of Table 5 resulted.

A graph of the Mean Sales (\$ 000) over the 1985-1992 period for those firms with arrangements ("salearr") and those firms without arrangements ("saleno") is shown below:

Figure 2



Mean Sales With and Without Arrangements 1985-1992

As can be seen in Figure 2, those firms with arrangements showed a steeper growth rate (slope) in the early '90s than those firms without arrangements but sales levels were higher for those firms without arrangements. A list of comparative statistics follows below for firms with arrangements and firms without arrangements.

Table 5 Comparison of Firms With and Without Arrangements

Comparative Statistics		85	89	92
MEAN SALES	w/o arrangements	4003	4022	4351
	with arrangements	2055	2253.7	3469
MEDIAN SALES	w/o arrangements	2000	2000	2000
	with arrangements	600	900	1500
STAGE OF GROWTH	w/o arrangements	2.06	3.125*	3.565
	with arrangements	1.57	2.166*	3.6595
AGE - START UP YEAR	w/o arrangements	76.8	-	-
	with arrangements	78.68	-	-
MANAGERIAL STYLE	w/o arrangements	2.47	3.227	4.76
	with arrangements	2.117	3.023	4.913
SUBJECTIVE PERFORMANCE	w/o arrangements	3.294	3.055	3.217
	with arrangements	2.516	2.378	2.923
START-UP R&D	w/o arrangements	33.181	-	-
	with arrangements	18.588	-	-
R&D % OF SALES	w/o arrangements	14.282	15.194	25.59
	with arrangements	12.333	30.111	24.55
NUMBER OF COMPANIES	w/o arrangements	18	20	26
	with arrangements	33	41	47

* indicates a significant difference

None of these categories in Table 4 above proved to be significantly different when tested using a Kruskal-Wallis test¹ or ttest² for non-equal variances, except firm stage of growth in 1989. (The Kruskal-Wallis test showed a significant value of $p = 0.03$) A ttest with unequal variances of the variable for a subjective company performance rating in 1985, found $Pr > |t| = 0.05$, but an insignificant Kruskal-Wallis test ($p = 0.11$).

At this point in the analysis, as the above sample grouping does not track the same firms longitudinally over the entire time period of the study, it was decided to isolate only those firms with sales figures for all three time periods. A Kruskal-Wallis test of the null hypothesis of identical population medians found significant differences between the median growth rate values for the period 1989-1992 [Growth(90s)] for those firms with collaborative arrangements, and those firms that did not have collaborative arrangements ($p = 0.004$). Out of the 50 firms reporting sales for all three time periods, 33 reported collaborative arrangements and 17 did not. A graph (Figure 3) of the median sales values (\$ 000) for each time period for firms with arrangements (variable "arrange") and for firms without arrangements (variable "noarr") is shown below. Then Figure 4 shows a graph of mean sales values for the group of 50 firms. Table 6, giving the mean and median sales values, is also shown below.

¹ The Kruskal-Wallis test is a non-parametric test of the null hypothesis of identical population medians.

² The ttest is a parametric test comparing the mean values for two groups and indicating significant differences.

Figure 3

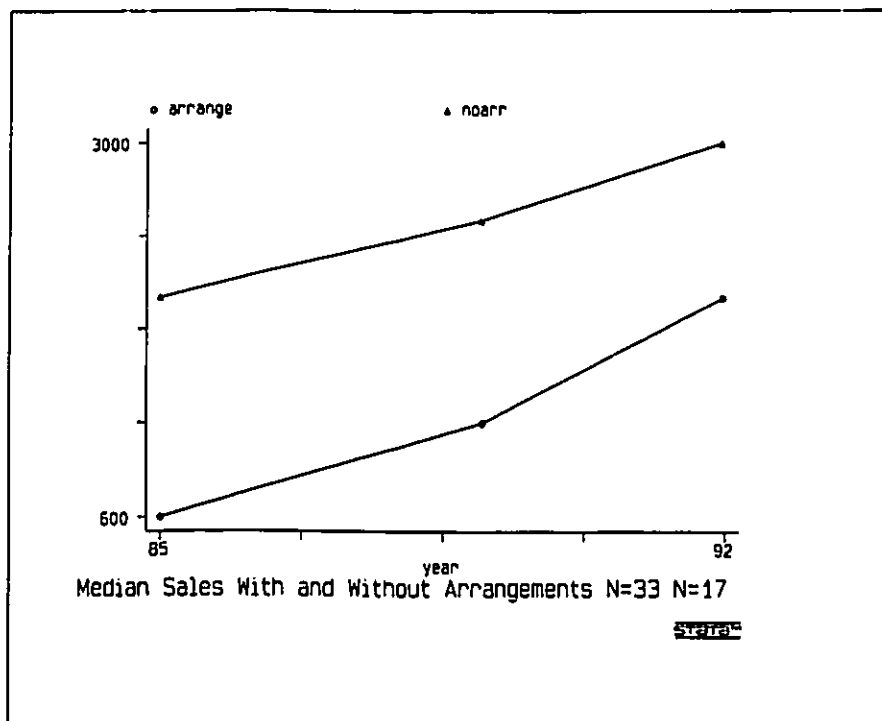
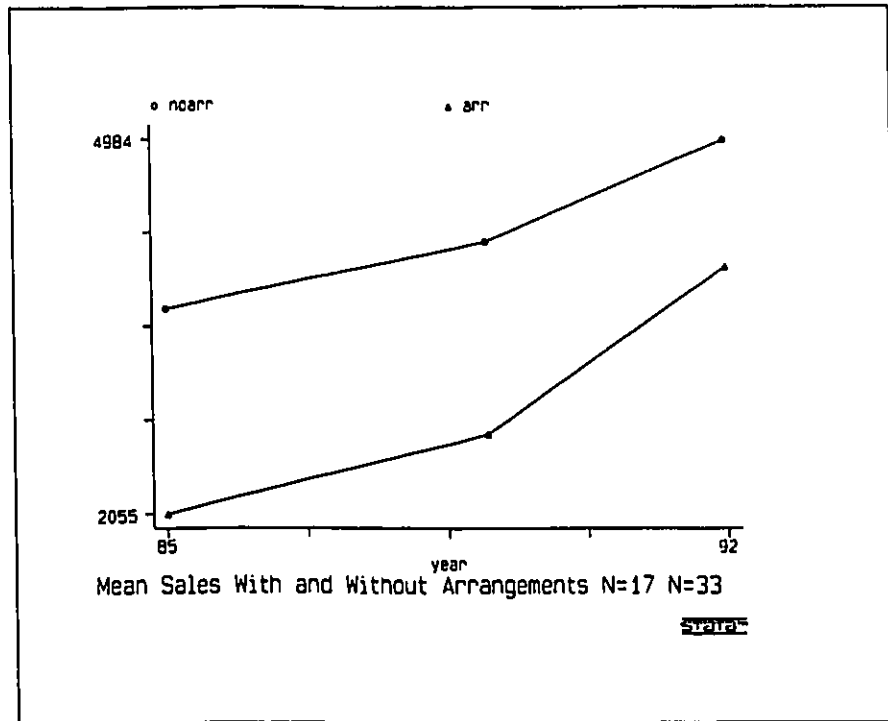


Table 6 Sales Values With and Without Arrangements 1985-1992

Sales Values	Mean or Median	Arrangements	No Arrangements
Sales 1985	Median	600	2000
	Mean	2055	3651
Sales 1989	Median	1200	2500
	Mean	2675	4179
Sales 1992	Median	2000	3000
	Mean	3985	4984

Figure 4



As can be seen from the preceding graphs, firms without arrangements consistently have a higher level of sales than firms with arrangements, but the rate of growth in sales, the slope of the lower line, of those firms that had arrangements is greater than that of firms without arrangements.

An analysis of factors which might differentiate firms with and without arrangements was carried out (see Table 7) comparing them on all of the factors given in the conceptual model except strengths and weaknesses which is considered later when dealing with

arrangement purpose. This comparison is made to see if there are other factors which might be influencing rate of growth rather than just the use of arrangements as an external strategy. It is interesting to note at this point that only three companies out of the entire group of 50 had gone public and all three were in the "no arrangements" category. None of the factors in the table showed a significant difference between measurements for firms with arrangements and firms without arrangements; one factor not shown in Table 7, as it was for a time period before 1992, was firm stage of growth for 1989. This variable showed a significant difference between firms with arrangements and firms without ($\text{Prob} > F = 0.02$).

An analysis was also made in regards to the proportion of exports in total sales and firm growth rates. There was no significant relationship between export levels and growth rate. There was also no significant difference between the percentage of sales to the U.S. in 1992 or to the rest of the world for those firms with arrangements and those without.

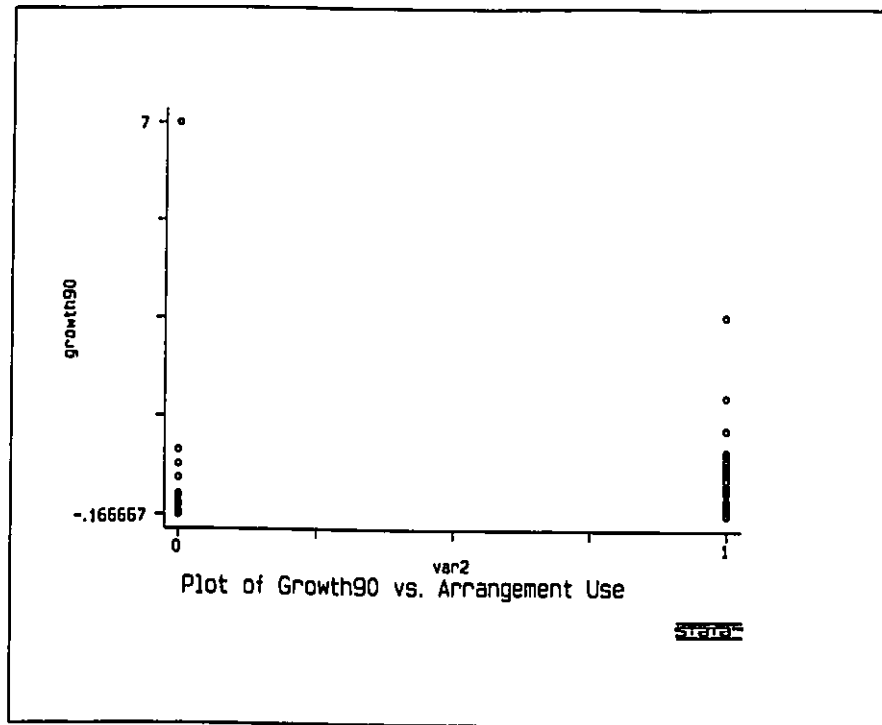
Table 7 Mean Values for Comparative Factors

FACTOR COMPARED	ARRANGEMENTS	NO ARRMT.
Stage of Growth '92	3.788	4.266
Entrepreneurial Outlook	5.151	5.294
Industry Stage '92	2.333	2.412
Product Type (%):		
Software	20%	18 %
Electronic Hardware	36%	35%
Telecommunications	14%	6%
Systems Design	30%	18%
Other	0%	23%
Competitive Position '92	2.219	2.063
R&D as % of Sales '92	12.733	17.629
Scope of Sales(%):		
Regional	35.594	24.118
Canada	29.185	33.529
U.S.	23.813	26.412
Rest of the World	10.809	16.529
Start-up Char: age	75.182	74.412

Furthermore, a subsequent ttest or Kruskal-Wallis test for significance between Growth90 values for industrial stage and for the product categories in 1992 revealed no significant differences.

The next step in the analysis involved a plot of Growth90 vs. variable 2, arrangement use, with 0 equal to no arrangements and 1 representing arrangement use.

Figure 5



As can be seen in Figure 5 above, there are several outliers in both groups, those firms with arrangements and those without, but in general, the cluster of points is higher for those firms with arrangements than for those without, indicating a higher growth rate.

The plot of the values of Growth90 revealed one extreme outlier with a growth rate of 7, or in other words 700% in the plot for firms with no arrangements, (see Figure 5). This outlier observation in the no arrangement group was dropped; it represented the growth shown in a firm which went from one employee in 1985 to 20 in 1992. This firm was in the telecommunications product area. A subsequent Kruskal-Wallis test now gave a probability = 0.0008. Thus, there was a very significant difference between the growth rate of companies with arrangements and the rate of companies without arrangements.

The firms with arrangements showed higher growth rates.

The growth rate for the late 80s was now generated for each group and compared for significance. A Kruskal-Wallis test of Growth80 by variable 2 (with & without arrangements) gave a significant value at the 10% level ($p = 0.07$). Finally, the growth rate (Grow) for the entire period of the study was generated. A Kruskal-Wallis test of Grow by variable 2 was very significant ($p = 0.005$). Thus, a significant difference is found between the rate of growth for firms with arrangements and without arrangements for the entire period of the study, 1985-1992 as well as for the smaller periods taken separately, the late 80's and the early 90's.

As a test of **hypothesis two**, the effect of stage of growth on arrangement use, a comparison was made of the number of arrangements entered into by firms in their mature stage as opposed to firms in early growth stages. For this analysis, an early stage firm was defined as any firm that rated its stage of growth as either 1 or 2 on the six point scale given in question 6 (see appendix 1). Stage 1 and 2 concern initial product development and early marketing. Any firm that responded with a rating of 3 or higher was grouped in the late or "mature" category. The late stage firms are characterised by a single product with a well established market or by several product generations or lines. The variable for stage of growth in 1989 was chosen as being most representative of the time period under study, 1985 to 1992/3, as it was somewhat in the middle of the time

period. A ttest (assuming unequal variances) of variable 2, arrangement use, for early and late stage firms was very significant ($|t| = 0.002$). A table with the mean values for arrangement use and number of arrangements for early and late stage firms is shown below:

Table 8 Mean Values for Arrangement Use Measurements

ARRANGEMENT USE	EARLY STAGE FIRMS	LATE STAGE FIRMS
YES OR NO (yes=1)	.84 out of 1	.48 out of 1
NUMBER OF ARR'S.	1.8	1

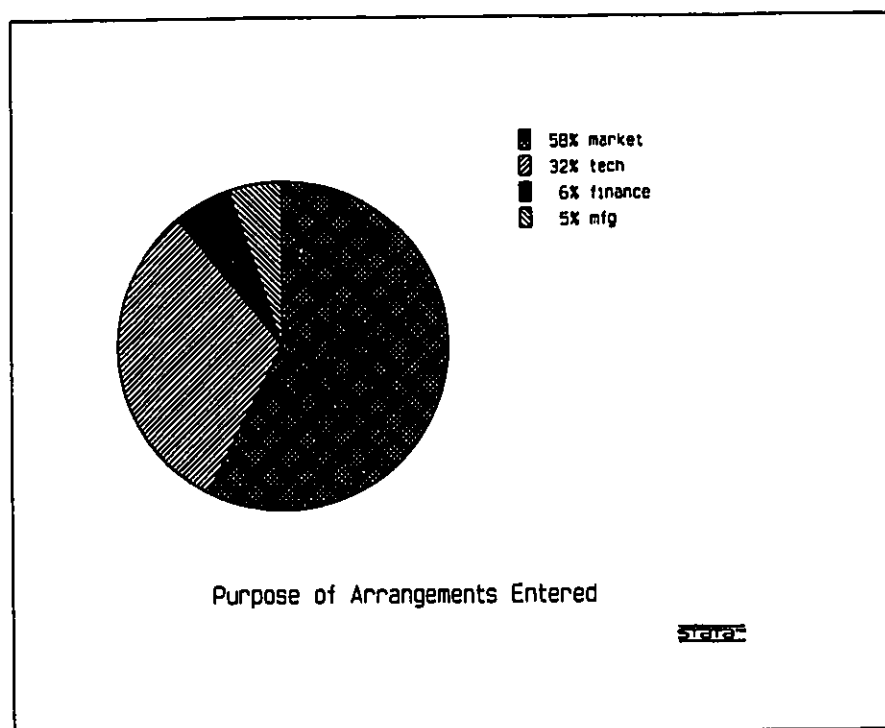
A comparison was also made between the growth rate of the mature firms and that of the early firms as well as the degree of entrepreneurial management present in the firm; no significant differences were found.

Thus, in summary, a significant difference was found in the number of arrangements made by late or "mature" firms and the number of arrangements made by early stage firms. Early stage firms entered into significantly more arrangements than late stage firms. This relationship between stage of growth and the use of arrangements did not hold to the same extent, however, with the other time periods, that is 1985 and 1992. A significant relationship at the 10% level was found for the 1985 time period (ttest unequal $Pr > |t| = 0.06$), but no significant difference was found for the 1992 time period. It is of note, however, that the whole body of firms evolved from being largely in the early stages in 1985 to largely in the later stages by 1992, according to the evaluation of the CEOs responding. This evolution may influence the results described above.

As a test of **hypothesis three**, which predicts the predominance of arrangements for marketing purposes, a comparison was made between the number of arrangements entered into for marketing or distribution purposes and the number for technological purposes. The results showed that out of the 96 arrangements reported, a marketing purpose was indicated in 122 instances and a technological purpose was indicated in 67 instances. For some arrangements more than one purpose was indicated. A total of 215 purpose statements were recorded. Subsequent analysis showed a significant difference between the number of arrangements entered into for marketing or distribution purposes and those entered into for technological purposes.

A pie chart showing the division of arrangement purpose between the four main groups of marketing & distribution, technology, financial and manufacturing is shown below in Figure 6. This purpose distribution can be compared to the results found by Ghemawat, Porter and Rawlinson (Ghemawat, Porter & Rawlinson 1986); in their study, Marketing Sales and Service accounted for 22% of the arrangements, Technology and Development for 20% of the arrangements, Operations and Logistics for 42%, and a Multiple Value category for 16%.

Figure 6



The number of marketing and distribution arrangements (122/189) and the number of technological arrangements (67/189) were found to be significantly different ($t = 4.0$). Thus, arrangements were formed by the high-tech firms in this study largely for marketing purposes and only secondly for technological purposes. A table with a breakdown of arrangement purpose by company stage and size follows below. The categories proved fairly similar.

Table 9 Purpose of Arrangements by Early/Late Stage and by Small/Medium Size Firms

PURPOSE OF ARRANGEM.	STAGE		SIZE	
	Early	Late	Small	Medium
	% of Arr's.	% of Arr's.	% of Arr's.	% of Arr's.
Market	54	61	63	52
Tech.	33	28	25	36
Other	13	11	12	12

(Based on the group of 72 firms)

Note: For this analysis the small vs. medium size category was delineated by median sales in 1992 (\$1.65 Million) with small being less than median, and medium $\geq$ median.

Multivariate Analysis

As shown in the Conceptual Model (Figure 1), strategy and performance are affected jointly by a number of variables. A series of multivariate analyses were performed on the data as well, in order to test further each of the research hypotheses.

Regression Analysis

As a test of **hypothesis one**, arrangement use, a logistic regression was carried out on variable 2 (var2: 0= no arrangement, 1 = arrangements) using all of the elements listed in Table 6, as well as two other factors, one for strength in marketing (var53) and one for strength in technology (var51). The results showed that the variable for the product category systems design showed significant values. The variable for firm stage of growth in 1989 also showed significant values. Thus, one of the product variables and the stage of growth variable for 1989 tested significant as a predictor of arrangement use.

As a test of **hypothesis two**, the relationship between stage of growth and arrangement use, a logistic regression of G1 (early and late stage firms) on variable 2, arrangement use found significant values ($P > |z| = 0.003$, Prob > chi2 = 0.002 and a negative coefficient of -1.6296). An ordered logistic regression of the variable for number of collaborative arrangements, and G1, early/late stage of growth, found the early/late stage grouping to be a significant predictor of the probability of more arrangements ($P > |z| = 0.02$ and Prob > chi2 = 0.01 and a negative coefficient for the G1 variable). Thus, the early/late stage variable is a significant predictor of arrangement use and of the number of arrangements entered into. The negative coefficient indicates that the more mature the firms, the smaller the number of arrangements formed.

As a test of **hypothesis three**, arrangement purpose, a further analysis was made comparing those firms that indicated a marketing purpose and those firms that indicated a technology purpose for their arrangement. Two groups were generated, one group was composed of those arrangements with a purpose that was indicated by checking either choices one through six or for expanding different markets or "to improve distribution". This first group represented all marketing arrangements. The second group was composed of all arrangements indicating a technological purpose, generally to enhance or develop products or technology, corresponding to choices seven through ten under question 3, (Purpose) on the questionnaire (see appendix 1). A new variable was generated (G1) such that $G1 = 0$ for a marketing arrangement, and $G1 = 1$ for a technical arrangement;

because of missing values, the analysis was done on 92 cases.

Next, a logistic regression was conducted on g1 (mkt vs. tech) listing those variables that measured firm strengths and weaknesses that were related to marketing and technology (question 4 on the questionnaire). In general, marketing and technological strengths and weaknesses as measured in question four showed little predictive value in regards to indicating a choice for marketing or technological arrangements.

Other factors were also considered in regards to their relation to entering marketing or technological arrangements, such as firm stage of growth, entrepreneurial outlook of management, product type, industry stage, competitive position, age, number of founders still with the firm, subjective performance rating, and R&D as a percentage of sales. The logistic regression showed significant values for the variables Stage of Growth 92 (with a negative coefficient), Distribution'85 (with a negative coefficient), Entrepreneurial Outlook of Management '85 & '89 (with a negative coefficient), the product category telecommunications (with a positive coefficient), and competitive position'85 (with a positive coefficient). Thus, there is a tendency for more mature firms to prefer marketing arrangements, as well as firms strong in distribution in 1985. In addition, the less entrepreneurial (i.e. less centralized) the management style the more likely the firm is to seek marketing arrangements. In contrast, the telecommunications product line and a strong competitive position in 1985 are strong predictors of the use of technical arrangements.

Multivariate Analysis Controlling for one Variable

The effect of arrangement year, product category, firm size and firm stage of growth were next analyzed in greater detail to determine if they were influential in affecting the firm's rate of growth in conjunction with the use of collaborative arrangements. As hypothesis one is the central focus of this thesis, it was given particular emphasis during the analysis.

Product Category Analysis

A more detailed analysis of the influence of product category on growth rate was conducted. The group of 50 longitudinal firms was used. A ttest using unequal variances was done on Growth90 by each product group. No significant results were found except for telecommunications firms which had a significantly higher median growth rate than other firms. A subsequent test to see if there were significantly more firms in telecommunications in the arrangement group (variable 2 ==1) showed no significantly different results (ttest unequal variances, and ranksum). A tabulation of telecommunication firms by variable 2, arrangement use, shows of the 8 firms in this product line, 7 entered into arrangements and one did not. The one that did not is the firm with the 700% growth rate. If that firm is dropped then this product variable becomes a perfect predictor of arrangement use. Also, once this firm is dropped, Growth90 becomes a significant predictor of arrangement use in a logistic regression.

An analysis of variance between Growth90 and the variables for the four product categories as well as the variable for arrangement use found only the telecommunications variable was even close to being significant (Pr = 0.05). But when the firm with the

growth rate of 7 was dropped, then the only significant variable was the one for arrangement use ($Pr = 0.03$). A table of the mean growth rates for the four product categories follows:

Table 10 Mean Growth Rates by Product (Early 90's)

Product	Arr. Use	Growth 90
Software	No	0
	Yes	1.0253
Elec. Hardw.	No	.2139
	Yes	.4659
Telecomm.	No	7
	Yes	.9984
System Des.	No	.5666
	Yes	.7734

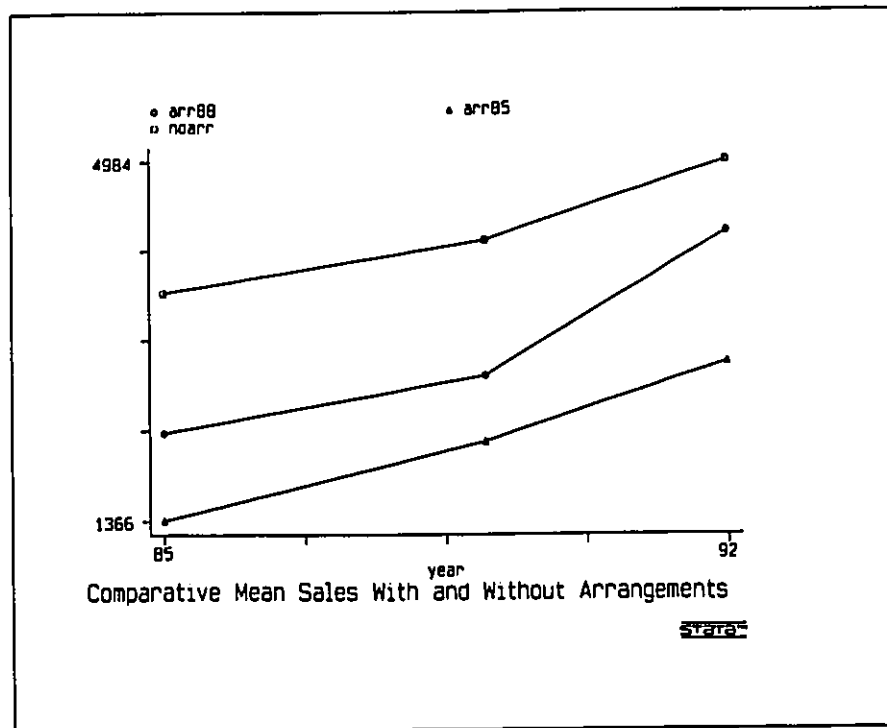
As can be seen in Table 10, the growth rate is consistently higher in all product categories for those firms using arrangements, if the outlier telecommunications firm is dropped.

Arrangement Year Analysis

An analysis was also made looking at three different groups, those firms with no arrangements ("noarr"), those with arrangements only in or after 1988 ("arr88"), and those with arrangements in 1985 or later ("arr85"). This division was made in order to try to isolate the delayed effect of any given arrangement on performance (a two year delay was estimated by Mosakowski, 1991). The resulting groups were 26 firms with arrangements only in or after 1988, 7 with arrangements in 1985 or after and 17 with no

arrangements. A graph of the comparative mean sales (\$ 000) of the three groups is shown below in Figure 7.

Figure 7



The graph does not appear to show any delayed effect such that the firms with arrangements in earlier years show a stronger rate of growth (steeper slope) than those firms with arrangements only in later years. A comparison of different variable means such as stage of growth, subjective performance, R&D as % of sales, showed no significant differences between those firms with arrangements only in the later years and those with early and late arrangements, so these two groups were recombined and the analysis proceeded.

Size Analysis

The analysis thus far shows no significant differences between the two groups in regards to the factors selected for study other than rate of growth for sales in the early 90s as well as some indications of a relationship for Grow (growth rate between 1985 and 1992) and firm stage of growth in 1989. At this point the analysis was made between small and medium sized firms. The study group of 50 was divided according to size with small being those firms with sales in 1992 less than or equal to \$1 million. Medium size firms were those with sales in 1992 greater than \$1 million but still no greater than \$50 million. This division produced 14 firms in the small category and 36 in the medium category, as can be seen in Table 11.

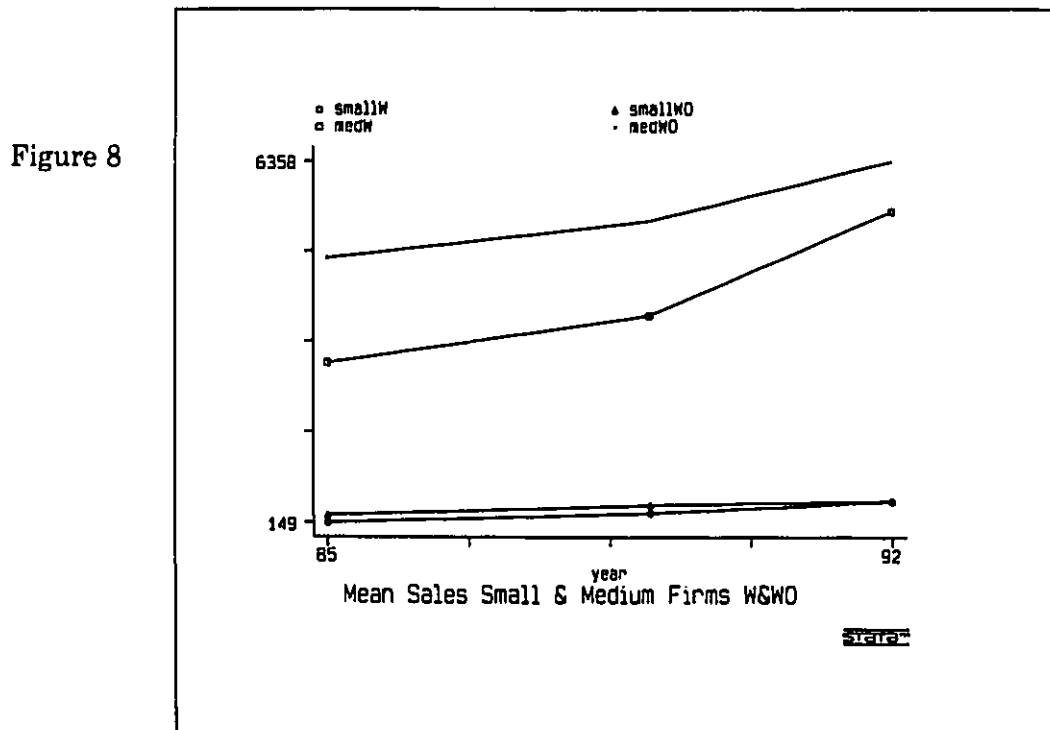
Table 11 Small and Medium Sized Firms

SIZE VS.ARRANGEMENTS	Small	Medium	TOTAL
No Arrangements	4	13	17
Arrangements	10	23	33
TOTAL	14	36	50

The group of 50 firms was tested for significant differences for growth rates (Grow = rate for period 1985 to 1992) between small and medium sized firms regardless of whether they entered arrangements or not. No significant differences were found using the Kruskal-Wallis test, or a ttest assuming equal variances. The comparison of Growth90 for the two groups (small and medium) also proved to be insignificant. There was a significant difference however between small and medium sized firms in regards to R&D % of Sales 1989, and the variable for start-up year. The mean value of R&D as a

percentage of sales for small firms was 24 %, while the mean for medium firms was 9%. The mean start-up year for small firms was 1980, while the year for medium firms was 1973.

A comparison was made next between the growth rate of small and medium sized firms, with and without arrangements. A graph of the mean sales values (\$ 000) for these four groups over the full time period from 1985 to 1992 is given below.



The variables "smallW" and "medW" stand for small firms with arrangements and medium sized firms with arrangements, respectively. The variables "smallWO" and "medWO" stand for small firms without arrangements, and medium sized firms without

arrangements, respectively. Figure 8 shows that the growth rate of the small firms both with and without arrangements is nearly identical, whereas the growth rate of the medium sized firms shows a difference in slope for the early 90s. This difference was found to be significant when the variable Growth90 was tested for medium sized firms with and without arrangements ($p = 0.0060$). The test was not significant with small firms. The group sizes for this analysis were the same as in Table 11. This analysis suggests that arrangements are only associated with a difference in growth rate for medium sized firms in the early 90's rather than for small firms. The analysis would seem to suggest that in the slow growth environment of 1989 through the early 90s, you have to make special efforts if you want to grow, such as participate in arrangements, but furthermore, a certain "critical mass" or size seems to be required in order to realize growth.

The next stage in the analysis was to compare in more detail the medium sized firms with and without arrangements. The variables Growth90 and Grow ("Grow" representing the rate of growth for the full period 1985 - 1992) were generated. A test for significant difference between the two growth rates showed a significant value for Growth90 as mentioned above ($p = 0.006$) but a significant p value was also now found for the variable Grow, ($p = 0.05$), so there is a significant difference between the median growth rate for medium sized firms without arrangements and with arrangements for the full longitudinal period. Further analysis of these two groups was conducted for mean sales value, and for the other comparative factors chosen previously such as stage of growth, industrial stage, product type, sales location, age, R&D as a % of sales and competitive position. A table of mean growth rates for medium sized firms with and without

arrangements, follows:

Table 12 Mean Growth Rates for Medium Firms

ARRANGEMENT USE	GROWTH90 (90'S)	GROW (85-92)
YES	.6947	3.407
NO	.6393	6.552
NO (without 7 value)	.1092	.5143

A logistic regression of these factors within the medium sized group showed higher values for software, for electronic hardware products, and for systems design. An analysis of variance (anova) for alliance formation and product category showed significant values for electronic hardware and for system design. Two tables showing the division by product between those medium sized firms with arrangements and those without are shown below. The first table shows the division for the product electronic hardware and the second is for system design. Subsequent tests of the effect of product line on growth rate (either Grow or Growth90) showed no significant differences. Thus the product category was eliminated as a possible explanatory factor in the difference of growth rates between medium sized firms with and without arrangements. No significant differences were found for medium sized firms for any other factors that were compared from the list of factors chosen for comparison within this research, as per Table 5.

Table 13 Electronic Hardware Product Category, Medium Firms

PRODUCT	ARRGMT	NO ARR.	TOTAL
OTHER PROD.	9	9	18
ELECTR. HDW	4	14	18
TOTAL	13	23	36

Table 14 System Design Product Category, Medium Firms

PRODUCT	ARRANGEMENT	NO ARRGMNT	TOTAL
OTHER	12	13	25
SYS.DESIGN	1	10	11
TOTAL	13	23	36

Stage of Growth and Growth Rate Analysis

As is discussed earlier, firm stage of growth as measured by variable 87, Stage of Growth 1989, is a significant predictor of arrangement use. In addition, a robust regression of Stage of Growth '89 on Growth90 shows a significant relationship as does the variable for arrangement use. Firms in their early stages of growth are more likely to use arrangements; there is a negative relationship between firms stage of growth and arrangement use. There is also a negative relationship between firm stage of growth and Growth90, rate of growth between 1989 and 1992.

A table comparing the growth rate of early and late stage firms as to whether they had arrangements or not is provided below:

Table 15 Growth Rate Early 90'S and Firm Stage (Early/Late)

Firm 's Strategy	Early	# of Firms	Late	# of Firms
Arrangements	.81	21	.46	12
No Arrangements	.35	4	.13	12
Equality Tests	10% *		7% *	

* level of significance

The table shows that, controlling for early/late stage, firms with arrangements still show a weakly significant, higher growth rate than firms without arrangements for both early stage firms and for late stage firms. Table 15 supports the analysis thus far, though the level of significance is not as strong as in earlier tests. It is interesting to note, in addition, the response of CEOs when asked to subjectively rate the effect of arrangement use on company performance; the next paragraph describes these results.

In regards to the effect of arrangements on the performance of a firm, for those firms that had arrangements, the CEOs consistently reported that these arrangements had largely a positive effect on the firms' competitive position, sales levels and technological position (see question 3, Impact of Collaborative Arrangement). Within the sample of 50 firms reporting full longitudinal data, when asked to rate the impact of the collaborative arrangements as good/positive, neutral, or bad/negative, the respondents replied as follows: none reported a negative effect, the impact on sales levels were neutral in 33% of the cases and positive in 67% of the cases; the impact on competitive position was neutral in 25% of the cases and positive in 75% of the cases; the impact on technological competency was neutral in 34% of the cases and positive in 66% of the cases. In general, arrangements were seen to have a positive effect on company performance when rated

subjectively by the CEOs.

Factor Analysis

It is difficult to estimate the individual effect of the explanatory variables on growth or the propensity to enter arrangements, because of correlation between variables. Factor Analysis was used to find the basic dimensions underlying the observed characteristics of the firm. The relationship between these basic dimensions and the growth rate and the propensity to enter arrangements is then analyzed.

The variables selected for Factor Analysis were the 1989 measurements of the elements represented in the conceptual model: stage of growth, entrepreneurial outlook of management, industrial stage of growth, competitive position, age, size, product, R&D as a percentage of sales, and scope of sales locations. The 1989 measurements were chosen as most representative of the full time period in that they were somewhat in the middle of the period under study.

Several of the variables were recoded to facilitate the factor analysis. Instead of the original stage of growth variable with six levels, the firms were recoded as early and late stage. Industrial stage was recoded as growing or mature with growing equal to stage one or two, and mature equal to stage three. The three firms recording a declining industrial stage (stage 4) were dropped as not representative of the rest of the sample. Thus, industry stage of growth of the firms in the sample are classified by their CEO to be either emerging/growing or mature, here coded as a 0 / 1 variable. Competitive

position was recoded as leader or follower with leader equal to a competitive position of stage one or stage two; a follower was a firm with a rating of stage three or four. After these adjustments and because of missing values, the Factor Analysis was based on 36 cases. Five factors were retained explaining 77.9 % of the variance.

The rotated factor loadings were as follows:

- F1 Firm stage of growth and Age
- F2 Industrial stage of growth and Competitive position
- F3 Product (telecommunications) and Scope of sales
- F4 Entrepreneurial outlook of management
- F5 Size

These results show that firm stage of growth loads with age but not with size. Therefore, size is relatively independent of factor one which could be termed "Maturity". Table 16 below shows the factor loadings greater than 0.5.

Table 16 Rotated Factor Loadings

Variable	F1	F2	F3	F4	F5
Firm Stage	0.85				
Managerial O.				0.97	
Industry Stage		0.75			
Competitive P.		-0.75			
Start-up Year	-0.72				
Size 1989					0.95
Product *			-0.81		
R&D % of Sales					
Scope of Sales			0.73		

* Product represents Telecommunications firm or not (0 / 1 variable)

Analysis of the Rate of Growth

A robust regression with factors one through five for rate of growth between 1989 and 1992 ("Growth90") resulted in only one factor showing a significant value, that was factor

$$\text{Growth90} = - 0.22 \text{ F1} - 0.05 \text{ F2} - 0.08 \text{ F3} - 0.01 \text{ F4} - 0.05 \text{ F5} + .44$$

one with $P > |t| = 0.002$. The other t values for factors two through five were as follows, F2 0.484, F3 0.233, F4 0.872 and F5 0.424. A regular regression gave a significant value for factor three as well as factor one but this result may not be as reliable as the robust regression, as the regular regression may be biased by outliers. In summary, firm maturity (F1) is the only significant predictor of firm performance, as measured by rate of growth. The more mature the firm the lower the rate of growth.

Analysis of the Propensity for External Collaboration

A logistic regression of factors one through five for predictive value as to the choice of an external arrangement or internal strategy found factor one fairly significant ($P= 0.055$) and factor three to be a very significant predictor ($P= 0.03$). So "maturity", Factor 1, and

$$\text{Arrangement Use} = - 1.03 \text{ F1} - 0.17 \text{ F2} - 2.15 \text{ F3} + 0.02 \text{ F4} - 0.39 \text{ F5} + 1.21$$

Factor 3 which can be termed "telecom product/scope of sales" are reasonable predictors of

arrangement use. The other factors had the following significance values, F2 0.662, F4 0.968 and F5 0.358. It is of note that the use of different product variables (i.e. software, electronic hardware, or system design) gave slightly different loadings on the five factors, but what was always consistent was the combination of age and stage of growth. For example, when the product variable for system design was used in a Factor Analysis, that product loaded with stage/age to give only one significant factor in a robust regression of factors 1-5 on Growth90. Finally, in summary, the preceding analysis reinforces the predictive power of Firm Stage of Growth and Age in regards to firm performance and the choice of an external strategy. The negative coefficient on F1 indicates that the early stage firms tend to form more arrangements than late stage firms.

CHAPTER FIVE: SUMMATION

5.1 Summary of Findings A summary of the findings derived from this research will be treated according to each hypothesis.

Hypothesis One

The results of this research show that there is a significant difference between the median rate of growth for medium sized firms that entered into arrangements between 1985 and 1993. This difference in growth rates is even more significant during the period 1989-1992. Small firms do not show any significant difference in performance whether they enter arrangements or not. Their growth rates are relatively flat across the period of study.

This evidence would tend to support the hypothesis that entering into arrangements leads to better firm performance, performance being measured as growth in sales. It is noteworthy, however, that firms that do not enter into arrangements have a higher sales level generally than those firms that enter into arrangements within the medium sized firm category. This difference was not so apparent within the small firm category. One possibility as to why the small firms did not show much of a growth rate in sales could be that the owners/managers were in a small firm because of the increased autonomy it offered and they were not that interested in growth rates as they would bring a degree of expansion that was not considered desirable and would threaten owner control levels. Firm stage of growth may also be a significant factor in these results, as this variable is a

significant predictor of arrangement use and within a robust regression is a significant predictor of rate of growth in the early 90's (variable Growth90). Furthermore, firm greater "maturity" is a significant predictor of lower growth rates.

It is interesting to note that Shan in his study (Shan 1990) found that firm size is negatively correlated with the use of cooperative arrangements and to some extent our results would support this finding in that the sales level of those firms that did not enter cooperative arrangements was higher than that of those firms that did enter into arrangements. This was true even within the small firm group within this study, though the difference was slight. McCann (McCann 1991) found that the highest performing ventures sought internal technological breakthroughs, but he did not consider marketing arrangements. It is also interesting to note the reasons given as to why firms did not enter into arrangements. The reason cited most often was that they were thinking of finding a partner but had been unable to do so. The second most popular explanation was "we have little need for outside help/resources." It is easy to understand that the largest firms, feeling the most successful, and competitively comfortable, would have less of an incentive to seek outside partners and solutions.

In summary, cooperative arrangements do appear to be a successful avenue for leading firms to growth, for the medium sized firm, particularly in the early 90's but this outcome may be a result of the firm's stage of growth as well.

Hypothesis 2

McCann (McCann 1991) found no significant relationship between firm stage of growth and the choice of internal versus external strategic options. This research did find a significantly higher number of arrangements for early stage firms than for late stage firms. The degree of entrepreneurial influence reported in the firms did not seem to have any significant effect on whether or not the firm entered into collaborative arrangements.

Hypothesis 3

There was a clear predominance of arrangements for marketing purposes as opposed to those for technological purposes. This finding would tend to support the idea that firms seek alliances in those areas that are not their direct area of expertise; thus in the marketing area for high-technology firms rather than in the technology area. This pattern could also be the result of a fear of revealing technological secrets, a problem that would not be as much of a factor in a marketing agreement.

5.2 Practical Implications

This research is intended to assist the practitioner in answering the question of whether it is better to go it alone or join forces with others in order to accomplish the firm's goals. The research results have shown that medium sized Canadian high-tech firms that choose to participate in collaborative arrangements do show a higher rate of growth than medium sized firms that do not choose an external arrangement. This trend was not found within the smaller sized firms of this study. Therefore, when trying to

answer the question of the optimum way to reach the firm's objectives, it is best to compare the practitioner's firm with those firms which match in size, and use the results obtained by this group of firms as a guide for the decision making process. A small size firm would find the use of arrangement a possible option but there would be less of an incentive to try such a strategy as there seemed to be little difference between the growth rates of these firms. The medium sized firm would have a greater incentive to try an external strategy as the differences between growth rates were significant. An early stage, medium sized firm would have even more of an incentive to use collaborative arrangements as the early stage group using arrangements showed the highest average growth rate of the firms studied. In general, it seems that external strategies are a good option for early stage firms, and still provide some advantage to late stage firms, even though they are less likely to enter into external arrangements.

5.3 Limits of the Research

One of the major limits of this research is the fact that though a relationship can be shown between arrangement use and growth rate, the experimental design does not allow for showing a cause and effect relationship. In order for cause and effect to be demonstrated, a group of firms would have to be isolated such that arrangement use could be dictated at random by the experimenters. Then, if the group with arrangements showed significantly higher growth rates, controlling for other factors, a cause and effect relationship could be deduced. Being as no such experimental design is practically possible, it is difficult to demonstrate conclusively, that the use of collaborative arrangements causes a higher growth rate.

Another element not considered within this research is the firm's history with collaborative arrangements in the past. Perhaps the more mature firms are not using arrangements because of having had poor experience with them in the past. This line of questioning was not pursued within the current research.

Thirdly, this research is dependent upon the quality of the responses given by the respondents. The respondents' replies could have been influenced by a wish to see the performance of their company in a positive light. It was noticeable that the performance of most firms was judged by their CEO to be improving over the period of the study. Such a longitudinal study is also dependant on the memory of respondents. Most firms seemed to report a great deal more arrangement use in the more recent years, (1990 - 1993). It is hard to say whether this is due to the greater use of arrangements or just that the passage of time has caused more distant arrangements to be forgotten.

Finally, a further limitation of the research is the small sample size. The findings are largely based on a group of 50 firms, a number that in some parts of the analysis decreases even further due to outliers or missing values for a particular variable being studied. Thus, though the sample of 50 firms seems quite comparable to the group of firms responding to the questionnaire in most respects, and the questionnaire group seems to reflect the general BOSS population, still a small sample size does diminish to some extent the strength of the study's results.

5.4 Conclusions

In conclusion, despite the preceding limitations, high-technology firms seem to be actively participating in collaborative arrangements and in general they find that these arrangements contribute positively to their sales levels and competitive position. An interesting research possibility for the future would be to see if the growth rate of medium sized firms involved in arrangements continues to be significantly higher than those firms not involved in arrangements. It could be that the state of the economy plays a role in this performance difference. In the good years anyone can do well but in the leaner years those who want to grow, and seek to cooperate in order to do so, will outperform those who try to go it alone.

REFERENCES

- Alonso Jose, William Bygrave, L.M. Gillin, Hiromitsu Kumamoto, Ron Sharp, and Clas Wahlbin (1993): "Implementation and Commercialization of Very Innovative High Technology in Different Cultures", Frontiers of Entrepreneurship Research, Babson College, Boston.
- Auster, Ellen R. (1990): "The Relationship of Industry Evolution to Patterns of Technological Linkages, Joint Ventures, and Direct Investment between U.S. and Japan", Dartmouth College, New Hampshire.
- Berkowitz, E., R.A. Kerin, W. Rudeliuf, F. Crane (1991): Marketing, 1st Canadian Edition, Richard D. Irwin Publishers, Boston.
- Brush, Candida G., Pieter A. VanderWerf (1990): "Measuring Performance of New Ventures", Frontiers of Entrepreneurship Research pp. 597-598.
- Buckley, Peter J., Mark Casson (1988): "A Theory in Cooperation in International Business", Cooperative Strategies in International Business, Lexington Books pp 31 - 53.
- Cardozo, Richard, Reynolds Paul, Miller Brenda and Ardishvili Alexander (1993): "Product-market Strategies and New Business Growth", Frontiers of Entrepreneurship Research Babson College, Boston.
- Christensen, Peder Smed, Ole Madsen and Rein Peterson (1989): "Opportunity Identification: The Contribution of Entrepreneurship to Strategic Management, Presentation at the 9th Annual Strategic Management Society conference "Strategies for Innovation", San Francisco, October 11-14.
- Contractor, F., and P. Lorange (1988): Cooperative Strategies in International Business, Lexington Books.
- _____*Creating Opportunity, The Liberal Plan for Canada* (1993): Liberal Party of Canada, Ottawa, Ontario.
- DeYoung, Garrett H. (1990): "Piecing Together Successful World-class Partnerships", Electronic Business, May 28, pp. 32-40.
- Dodge, Robert H. and John E. Robbins (1992): "An Empirical Investigation of the Organizational Life Cycle Model for Small Business Development and Survival", Journal of Small Business Management, Vol. 30, January, pp. 27-36.
- Doutriaux, J. (1991): "Effect of Initial Marketing and R&D Orientation on High-Tech Entrepreneurial Start-Ups", Journal of Small Business and Entrepreneurship, Vol. 8, No. 4, July - Sept, pp 9-27.
- Doutriaux, J. (1992): "Emerging High-Tech Firms: How Durable are their Comparative Start-Up Advantages?", Journal of Business Venturing, Vol. 7, No. 4, pp. 303-322.

Doutriaux, J. (1993): "Adjusting to Change: R&D and Marketing Strategies of Canadian Emerging High-Tech Firms: a follow-up study". Frontiers of Entrepreneurship Research, Babson College, Boston.

Doz, Yves L. (1988): "Technology Partnerships between Larger and Smaller Firms: Some Critical Issues" Cooperative Strategies in International Business, Lexington Books, pp. 317-338.

_____*The Economist*, "The Fall of Big Business", pp 13-14, April 17-23, 1993, Vol. 327, No. 7807.

Farok, J., Peter Lorange (1988): "Why Should Firms Cooperate?" Cooperative Strategies in International Business pp. 3-30.

Fernandez, Georges (1993): "Les Alliances Stratégiques" Les Cahiers du CETAI, Cahier Enseignement ENS 93-01, École des Hautes Études Commerciales, Montreal.

Forrest, Janet E. (1990): "Strategic Alliances and the Small Technology-Based Firm", Journal of Small Business Management, Vol. 28, No. 3 July, pp. 37-45.

Fowler, Karen L. and Dennis R. Schmidt (1988): "Tender Offers, Acquisitions, and Subsequent Performance in Manufacturing Firms", Academy of Management Journal, Vol. 31, No. 4, pp. 962-974.

Gartner, William B. and Robert R. Thomas (1992): "Factors Which Influence a New Firm's Ability to Accurately Forecast New Product Sales", Frontiers of Entrepreneurship Research Babson College, Boston.

Gugler, Philippe (1992): "Building Transnational Alliances to Create Competitive Advantage", Long Range Planning, Vol.25, No. 1, pp.90-99.

Ghemawat, Pankaj, Michael E. Porter and R.A. Rawlinson (1986): "Patterns of International Coalition Activity" Competition in Global Industries, Michael E. Porter, ed. Boston: Harvard Business School Press, pp. 345-365.

Hagedoorn, John and Schakenraad (1990): "Technology Cooperation, Strategic Alliances and Their Motives: Brother, Can You Spare a Dime, Or Do You Have a Light?", Paper for SMS conference, Stockholm, September 24-27.

Hamilton, William F., Harbir Singh (1992): "The Evolution of Corporate Capabilities in Emerging Technologies", Interfaces 22: 4, July-August, pp. 13-23.

Hanks, Steven H., Gaylen N. Chandler (1991): "An Examination of Functional Specialization in Emerging High Technology Firms" Frontiers of Entrepreneurship Research Babson College, Boston, pp. 625-637.

Harrigan, Kathryn Rudie (1988): "Joint Ventures and Competitive Strategy", Strategic Management Journal, Vol.9, pp. 141-158.

Hughes, G. David (1990): "Managing High-Tech Product Cycles", Academy of Management Executive, Vol.4, No.2, pp. 44-55.

Hull, Frank, Gene Slowinski, Robert Wharton, Koya Azumi (1988): "Strategic Partnerships between Technological Entrepreneurs in the United States and Large Corporations in Japan and the United States " Cooperative Strategies in International Business, F. Contractor, P. Lorange, eds., Lexington Books, pp. 445-454.

___ Industry, Science and Technology Canada, (1990): *Small Business in Canada, Competing Through Growth*, prepared by the Entrepreneurship and Small Business Office, Cat. No. C28-1/2-1990 E.

Kanuk, L., C. Berenson (1975) "Mail Surveys and Response Rates: A Literature Review, Journal of Marketing Research, November 12, pp. 440-453.

Kazanjian, Robert K. (1988): "Relation of Dominant Problems to Stages of Growth in Technology-based New Ventures", Academy of Management Journal, Vol.31, No.2, pp. 257-279.

Kazanjian Robert K., Robert Drazin (1989): "An Empirical Test of a Stage of Growth Progression Model", Management Science, Vol.35, No.12, pp. 1489-1503.

Kelly, Micheal J. (1993): "Building Successful Strategic Alliances: An Executive Briefing", External Affairs and International Trade, Ottawa, Canada.

Keeley Robert H., Robert W. Knapp (1993): "New Company Evolution: A Comparison of Large and Small Start-Ups", Frontiers of Entrepreneurship Research.

Kogut, Bruce (1988): "Joint Ventures: Theoretical and Empirical Perspectives", Strategic Management Journal, Vol. 9, pp. 319-332.

Larson, Andrea L. (1991): "Strategic Alliances: A Study of Entrepreneurial Strategies for the 1990's" Frontiers of Entrepreneurship Research, Babson College, Boston, p. 600.

Lehrer, Mark 1993: "Beyond The Rhetoric of Leadership: A Study of Impression Management in Corporate Entrepreneurship", Frontiers of Entrepreneurship Research Babson College, Boston.

Lorange Peter, Johan Roos and Peggy Simcic Bronn (1993): "Building Successful Strategic Alliances", EMR, Summer.

McCann, Joseph E. (1991): "Patterns of Growth, Competitive Technology, and Financial Strategies in Young Ventures", Journal of Business Venturing, 6, pp. 189-208.

McDougall Patricia P. and Benjamin M. Oviatt (1992): "A Longitudinal Study of the

Effects of Internationalization and Changes in Strategy on Changes in New-Venture Performance", Frontiers of Entrepreneurship Research, Babson College, Boston.

McDougall Patricia P. and Richard B. Robinson Jr. (1988): "New Venture Performance: Patterns of Strategic Behaviour in Different Industries", Frontiers of Entrepreneurship Research, Babson College, Boston, pp. 477-491.

McDougall, Patricia P., Richard B. Robinson Jr., Jeffrey G. Covin and Lanny Herron (1992): "The Effects of Industry Growth and Strategic Breadth on the Content of New Venture Strategies", Frontiers of Entrepreneurship Research, Babson College, Boston.

McGee, Jeffrey E. (1993): "Using Managerial Expertise to Enhance the Benefits of Inter-firm Arrangements: A Study of New Technology-intensive Ventures", Frontiers of Entrepreneurship Research, Babson College, Boston.

Mosakowski, Elaine (1991): "Organizational Boundaries and Economic Performance: an Empirical Study of Entrepreneurial Computer Firms", Strategic Management Journal, Vol. 12, pp.115-133.

Mugler, Josef and Kurt J. Miensenbock (1989): "Determinants of Increasing Export Involvement of Small Firms", ICSB 34th World Conference, Quebec, June.

Ohmae, Kenichi (1989): "The Global Logic of Strategic Alliances", Harvard Business Review, March-April, pp. 143-154.

Pegg, Owen, Rein Peterson and Theodoris Peridis (1992): "Strategic Alliances between Small and Large Firms: An Oxymoron?", Frontiers of Entrepreneurship Research, Babson College, Boston.

Ragab, Megeed (1992): "The Business Environment of the 1990's: Implications for Entrepreneurship Research", Journal of Small Business and Entrepreneurship Vol. 10, No. 1, Oct-Dec, pp. 70-80.

Roberts, E.B. (1991): Entrepreneurs in High Technology, Oxford University Press.

Ryans, John K. Jr. and William L. Shanklin (1984): "High-Tech Megatenets: 10 Principles of High Technology Market Behavior", Business Marketing, September, pp. 100-105.

Scott, Mel and Richard Bruce (1987): "Five Stages of Growth in Small Business", Long Range Planning, Vol. 20, No. 3, pp.45-52.

Sexton, Donald L. (1988): "Propensity For Change: A Prerequisite For Growth in High Technology Firms", Frontiers of Entrepreneurship Research, Babson College, Boston.

Shan, Weijan (1990): "An Empirical Analysis of Organizational Strategies by Entrepreneurial High-technology Firms", Strategic Management Journal, Vol.11, pp. 129-139.

Sherman, Stratford (1992): "Are Strategic Alliances Working?", Fortune, September 21, pp. 77-78.

Slowinski, Gene (1992): "The Human Touch in Successful Strategic Alliances", Mergers & Acquisitions, Vol.27, pp. 44-47.

Steen, Roland (1990): "Managing High-growth Through Networking", Paper presented at SMS-Conference.

Stewart, David B. (1993): "Strategic Alliances: A Small and Medium Sized Firm Perspective", ASAC conference paper, Alberta.

Stuart Robert W. and Richard Leifer (1988): "The Organizational Design of Effective New Technical Ventures", Paper submitted to the Entrepreneurship Division for the 1988 National Meeting of the Academy of Management, January.

Teach, Richard D., Robert G. Schwartz, Fred A. Tarpley, Jr., (1991): "Pricing Strategies and Performance in Entrepreneurial Micro-Electronics Firms" Frontiers in Entrepreneurship Research Babson College, Boston, pp. 613-624.

Tyebjee, Tyzoon T.(1990): "The Internationalization of High Tech Ventures", Frontiers of Entrepreneurship Research, Babson College, Boston, pp. 452-467.

Vink-Ellis, Dyna (1991): "Key Factors of Success in Strategic Partnerships: A Case Study Approach", School of Business, Carleton University, Ottawa.

Vink-Ellis, Dyna (1989): "Strategic Partnerships and the Technology Life Cycle", Technology Management Student Paper Competition, School of Business, Carleton University, Ottawa.

Wheelen, Thomas L., J. David Hunger (1992): Strategic Management and Business Policy, Addison-Wesley Publishing Co.

APPENDIX 1



UNIVERSITÉ D'OTTAWA
UNIVERSITY OF OTTAWA

FACULTÉ D'ADMINISTRATION
FACULTY OF ADMINISTRATION

January 1994

Dear

Is it better to go it alone or to join forces with other firms? I would like to invite you to participate in a study designed to answer this question frequently asked by Canadian high-tech CEOs. The objective of this study, based on a confidential survey and financed by the Social Science and Humanities Research Council of Canada, is to compare the success of in-house strategies with that of strategies based on external collaborative arrangements as selected by emerging high-tech firms in adaptation to environmental change.

The current project began in the spring of 1993 with a pilot study. As outlined on the Research Objective insert, two key words characterize the adjustment strategies selected by the 27 firms which responded to a semi-structured interview: product-technology focus, and market development through exports. To our surprise, however, and contrary to common belief, few firms entered into formal collaborative arrangements to further their goals, and --in our small sample--, the best strategies seemed to be internal for R&D and external for marketing. Our objectives are to probe in more depth the advantages and characteristics of the external formal and informal collaborative arrangements selected by Canadian high-tech firms to better document winning strategies.

I have been doing research in this area for several years, with results reported in professional journals and at conferences. One of my papers on the positive impact of government sourcing on high-tech firms was reprinted in Ontario's "Report on Small Business".

The results of the analysis will be distributed to all interested respondents and summarized for publication in business/professional journals, to maximize feedback to practitioners.

The attached questionnaire was reviewed by a few local entrepreneurs who felt comfortable with it. I would very much appreciate your taking the time to complete and return it as soon as feasible. A pre-addressed return envelope is attached for your convenience. This questionnaire, ****confidential once completed****, should not require more than 30 minutes of your time.

(.../2)

136 JEAN-JACQUES-LUSSIER CP 450 SUCC A
OTTAWA ON K1N 6N5 CANADA

136 JEAN-JACQUES LUSSIER PO BOX 450 STN A
OTTAWA ON K1N 6N5 CANADA

(613) 564-2452 • TÉLÉC./FAX (613) 564-6518

The following measures are being taken to ensure confidentiality: All information will be aggregated to prevent identification of individual companies in final reports. The completed questionnaires and supplementary information will be accessible only to my university research assistants and myself. In no case will names or individual information be released to people outside my immediate research team.

If you have any questions or comments, do not hesitate to contact me at the University of Ottawa (Professor Jérôme Doutriaux, tel. (613) 564-6590, FAX (613) 564-6518).

Thanking you in advance for your assistance and support.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jérôme', followed by a stylized flourish or mark.

Jérôme Doutriaux, professor
tel. (613) 564 6590; Fax (613) 564 6518

- Inserts:
- outline of our Research Objectives
 - questionnaire with an optional personal information insert and
 - pre-addressed/stamped return envelope

Collaborative Strategies and Performance: The Case of the Emerging Firm

*** A nationwide survey of Senior Canadian Executives --Winter 1994--***

RESEARCH OBJECTIVES

To answer questions frequently asked by Canadian high-tech CEO'S, we interviewed 27 Canadian CEO's in the microelectronics and communications industries. The following questions seemed uppermost in their minds:

How did those who are doing well get there ?

Is it better to go it alone, or to join forces with others ?

What does research have to say about the importance of R&D ?

How can marketing activities be strengthened ?

This longitudinal study of Canadian high-tech firms over the period of 1986 to 1993 focuses on the second point, **to go it alone or join forces with other firms**, looking at company performance trends in relation to factors such as:

* use of collaborative arrangements	*	market orientation
* R&D activity	*	choice of strategy
* start-up conditions	*	export development
* managerial style	*	stage of company development

In 1986, 72 Canadian high-tech firms were surveyed and the results were subsequently analyzed and published¹. Then in 1993, a follow up study was conducted, locating 56 of the original 72 companies. Twenty-seven of the 56 companies located, were interviewed by phone with the following **preliminary findings**.

1. "Survivor" firms (the 56 firms that were located) showed significantly higher levels of R&D and export activity than those firms included in our original 1986 survey which seem to have disappeared (i.e. moved, merged, went bankrupt).
2. Firms using internal innovation and R&D strategies had a better performance according to the subjective evaluation of their CEO's.
3. Firms that entered into collaborative marketing agreements with other firms showed a higher growth rate than those firms that did not enter into such agreements.
4. A typical strategy used to confront the economic challenges of the past few years was to re-focus activities on a smaller number of products/technologies and to develop export markets.

THIS CURRENT SURVEY IS BEING SENT TO OVER 1000 CANADIAN HIGH-TECH COMPANIES in order to get a more reliable basis for answering the questions of Canadian high-tech CEO's. We would appreciate your help and hope that you will find the results (to be mailed by July 1994) useful.

1. Doutriaux J., 1991, "High-Tech Start-ups, Better Off with Government Contracts than with Subsidies", *IEEE Transactions on Engineering Management*, 1991, V.38, N.2, pp. 127-135.

Doutriaux J., 1992, "Emerging High-Tech Firms: How Durable are their Comparative Start-up Advantages?", *Journal of Business Venturing*, V. 7, N. 4, pp. 303-322.

Doutriaux J., 1991, "Effect of Initial Marketing and R&D Orientations on High-Tech Entrepreneurial Start-ups", *Journal of Small Business and Entrepreneurship*, V. 8, N. 4, July -September, pp. 9-27.

Collaborative Strategies and Performance: The Case of the Emerging Firm

*** A nationwide survey of Senior Canadian Executives ***
--Winter 1994--

This research project, directed by Professor Jérôme Dautriaux of the University of Ottawa, deals with the effect of external collaborative strategies on the performance of emerging high-tech firms.

A summary of the findings will be sent to all the respondents who complete the "personal information" insert or who send a request under separate cover to maximize confidentiality.

The questionnaire, ****confidential once completed****, should not require more than 30 minutes of your time. If you have any questions or comments, please do not hesitate to contact Professor Dautriaux at the University of Ottawa, Ottawa, Ontario K1N 6N5 (tel. (613) 564-6590, FAX (613) 564-6518).

Part I -- Collaborative Arrangements

1. During the period 1985-1993 did your firm/division enter into any collaborative arrangements¹ with other firms?

☐ No ☐ Yes [If "Yes" proceed to question 3]

2. If "No" check all that apply below and then proceed directly to question 4, page 2.

- ☐ We are interested but no real opportunity has come along
- ☐ We have little need for outside help/resources
- ☐ We have more than enough to do in our own firm
- ☐ Not interested
- ☐ Other (please specify) _____

3. If you have entered into collaborative arrangements during 1985-1993, please provide appropriate information as requested, one arrangement per column; for more than five arrangements, please duplicate pages 1, and 2.

Arrangement	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -
Year Entered:					
Type: (check one)					
Joint Venture	☐	☐	☐	☐	☐
Formal partnering agreement	☐	☐	☐	☐	☐
Informal partnering agreement	☐	☐	☐	☐	☐
Licensing agreement	☐	☐	☐	☐	☐
Other (please specify)	☐	☐	☐	☐	☐
Purpose: (check one)					
Expand existing markets	☐	☐	☐	☐	☐
Establish new markets					
In Canada	☐	☐	☐	☐	☐
In the USA	☐	☐	☐	☐	☐
In Europe	☐	☐	☐	☐	☐
In Far East	☐	☐	☐	☐	☐
Other (name) _____					
Enhance existing products	☐	☐	☐	☐	☐
Develop new related products	☐	☐	☐	☐	☐
Develop new unrelated products	☐	☐	☐	☐	☐
Develop generic technological capability ("research")	☐	☐	☐	☐	☐
Improve financial position	☐	☐	☐	☐	☐
Improve manufacturing capability	☐	☐	☐	☐	☐
Improve distribution	☐	☐	☐	☐	☐
Other (please specify)	☐	☐	☐	☐	☐
Duration: Was the duration of the agreement:					
Fixed	☐	☐	☐	☐	☐
Open, formal review system	☐	☐	☐	☐	☐
Open, no review system	☐	☐	☐	☐	☐

¹ For the purposes of this study, a collaborative arrangement is defined as a formal or informal agreement between two or more firms to perform or develop certain functional activities; however, each firm retains its separate legal status.
For example, collaborative arrangements include joint ventures, licensing agreements and strategic alliances. They do not include mergers, acquisitions or contract work.

<u>Arrangement(continued)</u>	<u>- 1 -</u>	<u>- 2 -</u>	<u>- 3 -</u>	<u>- 4 -</u>	<u>- 5 -</u>
<u>Level of Formalization:</u> Were the objectives, roles and expectations of the agreement:					
Well defined	☐	☐	☐	☐	☐
Generally defined	☐	☐	☐	☐	☐
Vague and open ended	☐	☐	☐	☐	☐
Were the objectives, roles and expectations of the agreement defined in a formal written contract?					
(✓ = Yes)	☐	☐	☐	☐	☐
<u>Past Experience:</u> Have you had previous experience with a similar arrangement?					
(✓ = Yes)	☐	☐	☐	☐	☐
<u>Partner's Head Office Location:</u>					
Canadian Province or Country:	_____	_____	_____	_____	_____
<u>Partner's Size:</u>					
Much smaller than you	☐	☐	☐	☐	☐
Smaller than your firm	☐	☐	☐	☐	☐
Same size	☐	☐	☐	☐	☐
Larger than your firm	☐	☐	☐	☐	☐
Much larger than your firm	☐	☐	☐	☐	☐
<u>Partner's Characteristics (check all that apply)</u>					
-Had one main product line	☐	☐	☐	☐	☐
-Had several product lines	☐	☐	☐	☐	☐
-Was a technological leader	☐	☐	☐	☐	☐
-Had established markets					
in a single country	☐	☐	☐	☐	☐
in several countries	☐	☐	☐	☐	☐
<u>History with this firm:</u> Had you had other cooperative arrangements with this firm earlier?					
(✓ = Yes)	☐	☐	☐	☐	☐
<u>Level of Success:</u> Was this arrangement successful in meeting the objectives which were initially defined?					
More than expected	☐	☐	☐	☐	☐
Completely	☐	☐	☐	☐	☐
Mosily	☐	☐	☐	☐	☐
Somewhat	☐	☐	☐	☐	☐
Not at all	☐	☐	☐	☐	☐
Not Applicable (Too soon to tell)	☐	☐	☐	☐	☐
<u>Impact of Collaborative Arrangement:</u> write "G" for Good/positive, "N" for neutral, "B" for Bad/negative:					
-on sales level	_____	_____	_____	_____	_____
-on competitive position	_____	_____	_____	_____	_____
-on technological competency	_____	_____	_____	_____	_____
<u>Factors which may have reduced the effectiveness of the cooperative arrangement (check one or two only):</u>					
Partner's lack of commitment	☐	☐	☐	☐	☐
Our lack of commitment	☐	☐	☐	☐	☐
Poor choice of a partner	☐	☐	☐	☐	☐
Lack of common understanding between firms ☐	☐	☐	☐	☐	☐
Opportunity which led to decision					
no longer available	☐	☐	☐	☐	☐
Changes in our objectives	☐	☐	☐	☐	☐
Other (please specify)	☐	☐	☐	☐	☐
<u>Current Issues: did the following affect your decision to enter this arrangement? (✓ = YES):</u>					
-1988 Free Trade Agreement (FTA)	☐	☐	☐	☐	☐
-1992 North American FTA (NAFTA)	☐	☐	☐	☐	☐

Part II--Your Company in 1985-86, 1988-89 and now

4. Which have been particular strengths or weaknesses for your company? Write S for strength, W for weakness when appropriate in the space provided.

	<u>In 85-86</u>	<u>In 88-89</u>	<u>In 92-93</u>
Technological expertise	_____	_____	_____
R&D expertise	_____	_____	_____
Marketing expertise	_____	_____	_____
Financial matters	_____	_____	_____
Distribution system	_____	_____	_____
Manufacturing	_____	_____	_____
International experience	_____	_____	_____
Other (Please specify)	_____	_____	_____

5. Which of the following best describe the typical behaviour of your company? (Check one for each time period)

	In 85-86	In 88-89	1992-93
-Find markets and develop technologies ² for new product ³ ideas	☐	☐	☐
-Develop products and markets based on our technological expertise	☐	☐	☐
-Assess what customers in the marketplace want and then develop new products and technologies based on their needs	☐	☐	☐

6. Stage of Growth - Which of the following scenarios best fits your organization? (Please choose only one)

	In 85-86	In 88-89	1992-93
-Mainly concerned with initial product development/design, securing financial resources, developing a market	☐	☐	☐
-Well developed product ready for production/sales but not yet established in market; have some sales and some orders	☐	☐	☐
-Single product line, high growth in sales and number of employees; want to start producing high volume with profitability	☐	☐	☐
-Now concerned with the development of 2nd & 3rd generation products, and totally new product lines	☐	☐	☐
-Have several product lines; want to penetrate new geographic areas	☐	☐	☐
-Other (please explain) _____	☐	☐	☐

7. Sales and employment. Please answer question 7.1 or, if you prefer, 7.2.

7.1 Please give the annual sales and employee levels for the three time periods indicated:

Year	1985-86	1989-90	1992-93
Sales (1,000's of Dollars)	_____	_____	_____
Number of Employees	_____	_____	_____

OR

7.2 Please give the range of your sales in 1985-86 and the ratio of the sales levels in the time periods indicated as well as the number of employees.

1985-86 sales level:	☐ Less than 200K	☐ 200-499K	☐ 500-999K
	☐ 1000-4999K	☐ 5000K and over	
Ratio of 1989-90 sales over 1985-86 sales:	_____	# of Employees, 1985/86: _____	
Ratio of 1992-93 sales over 1989-90 sales:	_____	# of Employees, 1989/90: _____	
Ratio of 1992-93 sales over 1985-86 sales:	_____	# of Employees, 1992/93: _____	

8. Geographical Distribution of sales (% of sales value):	1985-86	1989-90	1992-93
Regional	_____	_____	_____
Rest of Canada	_____	_____	_____
U.S.-Mexico	_____	_____	_____
Rest of World	_____	_____	_____
Total	100%	100%	100%

9. Subjective Assessment of firm's performance: for each year, please enter VP(very poor), P (poor), A (acceptable), G (good), VG (very good), or E (excellent)

	1985-86:	1989-90:	1992-93:
10. Research and Development expenditures, and employees as a % of sales and of total employment	_____	_____	_____

Years	1985-86	1989-90	1992-93
- R&D Expenditures (% of Sales)	_____	_____	_____
- % of total R&D spent on core technologies rather than to support <u>current</u> products:	_____	_____	_____
- R&D Employees (% of total employees):	_____	_____	_____

11. Relative importance of various sources of information and new ideas; please rank the following from the most important ("1") to the least important ("10"):

	Technology	New Products	Markets
Personal network	_____	_____	_____
Customers	_____	_____	_____
Suppliers	_____	_____	_____
Technical literature	_____	_____	_____
R&D and engineering staff	_____	_____	_____
Marketing staff	_____	_____	_____
Professional/technical association	_____	_____	_____
Industrial partners	_____	_____	_____
Commercial partners	_____	_____	_____
Other (Please specify) _____	_____	_____	_____

² In this questionnaire, *technology* is defined as the set of ideas embodied in the product or service, or the set of ideas involved in the production of the product or service.

³ The term *product* is used within this questionnaire as the principal source of revenue to your company, this could be a product, product line or services. A *product line* is defined as a set of related or complementary products.

12. **Managerial Style:** please position your firm on the scale from 1 to 10 (mark with an "x") where a score of :
 1 = The president/entrepreneur is central to all functions, communications and major decisions.
 10 = Firm is led by a top management team of individuals with broad delegation of decision making.

<u>In 85-86</u>	1	5	10
<u>In 89-90</u>	1	5	10
<u>In 92-93</u>	1	5	10

13. Firm's main domain of activity: S = software, EH = electronic hardware, T = telecommunications, SD = systems design.
 Q = other: _____

In 85-86 In 89-90 In 92-93

14. Industry Structure: Which structure best describes your industry in Canada and internationally?

<u>Year</u>	<u>In 1985-86</u>		<u>In 1992-93</u>	
<u>Scope</u>	<u>Cdn</u>	<u>World</u>	<u>Cdn</u>	<u>World</u>
Many small to medium sized firms	—	—	—	—
One large firm and many small firms	—	—	—	—
A few larger firms and many small firms	—	—	—	—
A few small firms	—	—	—	—
Only one firm in this niche market	—	—	—	—
Other, please describe _____	—	—	—	—

15. Which of the following best describes the growth stage of the industry in which your company competes :

In 85-86 In 89-90 In 92-93

Emerging	—	—	—
Growing	—	—	—
Mature	—	—	—
Declining	—	—	—

16. What competitive position did your firm occupy within your industry worldwide during the years indicated?

In 85-86 In 92-93

"Lone star" --no competition	—	—
A leader	—	—
A follower	—	—
A distant follower	—	—

Start-up Information (...To the best of your knowledge)

17. Year firm created 19

18. Type of creation:

☐ Independent, entrepreneurial firm ☐ Division ☐ Subsidiary ☐ Joint Venture

19. If your company is public, in which year did it go public? 19

20. If your company went through significant organizational/corporate changes (merged, taken over...), please give event and year:

Year: _____, event: _____

Year: _____, event: _____

Year: _____, event: _____

21. Number of original founders: _____

How many of the original founders are still with the firm? _____

22. Total first and second year sales (1000 of dollars): _____ (1000 \$)

Average first and second year R&D to sales ratio: _____ %

Average first and second year export to total sales ratio: _____ %

Average first and second year public sector sales to total sales ratio: _____ %

Average percent of first and second year income due to sale of products rather than service work or investments: _____ %

23. Expertise of founding team at start-up: Low Average High Very High

In marketing ☐ ☐ ☐ ☐

In finance ☐ ☐ ☐ ☐

In management ☐ ☐ ☐ ☐

In R&D ☐ ☐ ☐ ☐

With our sincere thanks for your time in completing this questionnaire.

Please return the completed questionnaire in the post-paid return envelope provided or send it to:

Professor Jérôme Doutriaux, University of Ottawa, Faculty of Administration,

136 Jean-Jacques Lussier, Ottawa, Ontario K1N 6N5, Tel: (613) 564-6590 FAX: (613) 564-6518

Collaborative Strategies and Performance: The Case of the Emerging Firm
***** A nationwide survey of Senior Canadian Executives *****
--Winter 1994--

Personal Information
*****Optional*****

Name: _____

Title/Responsibility: _____

Company Name: _____

Address: _____

Telephone: ()

FAX: ()

* To obtain a copy of the report, either give your name and address here (June 1994), or, for increased confidentiality, send us a request under separate cover.

Would you be willing to participate in a more detailed study of your company to create business case studies and promote further research ?

☐ Yes ☐ No

With our sincere thanks for your time in completing this questionnaire.

Please return the completed questionnaire in the post-paid return envelope provided or send it to :

Professor Jérôme Doutriaux
Faculty of Administration, University of Ottawa
136 Jean-Jacques Lussier, Ottawa, Ontario K1N 6N5
Tel: (613) 564-6590 FAX: (613) 564-6518



Janvier 1994

Monsieur, Madame

Vaut-il mieux se débrouiller tout seul ou se joindre à d'autres? J'aimerais vous inviter à participer à une étude réalisée pour répondre à cette question souvent posée par les présidents d'entreprises canadiennes à technologie avancée. L'objectif de cette étude, **basée sur une enquête confidentielle** et financée par le Conseil de recherche dans les sciences Humaines du Canada, est de comparer le succès des stratégies internes avec celui des stratégies basées sur des accords de collaboration dans le cas de jeunes entreprises à technologie de pointe cherchant à s'adapter à l'évolution de l'environnement.

Ce projet a commencé il y a quelques mois: tel que résumé sur la feuille d'objectifs de recherche ci-jointe, deux mots clé caractérisent les stratégies d'ajustement choisies par les 27 entreprises qui ont participé à des entrevues téléphoniques semi-structurées: **ciblage** produit-technologie, et développement de marchés par **l'exportation**. A notre grande surprise cependant, et contrairement à l'impression donnée dans la presse, peu d'entreprises sont entrées dans des accords **formels** pour atteindre leurs objectifs. Dans notre petit échantillon, les meilleures stratégies ont semblé être internes pour la technologie et externes pour le marketing. Notre objectif est d'étudier en plus grand détails les caractéristiques des accords de coopération externes **formels et informels** choisis par les entreprises canadiennes à technologie avancée afin de mieux documenter les stratégies gagnantes.

Cela fait plusieurs années que je fais de la recherche dans ce domaine. Les résultats de mes analyses ont été publiés et présentés à des conférences. L'une de mes communications sur l'effet positif sur les jeunes entreprises à base technologique des politiques d'approvisionnement des services publics a été reproduite par le gouvernement de l'Ontario dans son rapport annuel sur l'état des petites entreprises.

Les résultats de l'analyse seront envoyés à tous les participants intéressés (Juin 1994) et résumés dans des revues d'affaires et professionnelles afin de maximiser la dissémination de l'information aux praticiens.

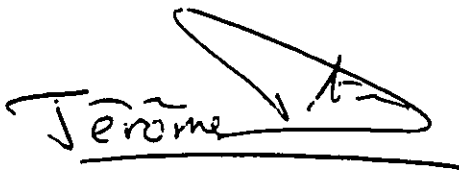
(.../2)

Le questionnaire ci-joint a été revu par des entrepreneurs de la région. J'apprécierais beaucoup si vous pouviez le compléter et le renvoyer dès que possible. Une enveloppe de retour pré-affranchie est incluse pour vous faciliter la tâche. Ce questionnaire, **** confidentiel dès que rempli****, ne devrait pas prendre plus de 30 minutes de votre temps.

Les mesures suivantes sont prises afin de respecter l'anonymat des répondants: Toute l'information reçue sera agrégée pour rendre impossible l'identification d'une entreprise dans toute communication ou publication. Les questionnaires complétés ne seront accessibles que par mes assistants de recherche à l'université et par moi. Dans aucun cas des noms de participants ou des données individuelles ne seront mises à la disposition de personnes externes à mon équipe de recherche.

Si vous avez des questions ou des commentaires, n'hésitez pas à communiquer avec moi à l'Université d'Ottawa (Professeur Jérôme Doutriaux, téléphone (613) 564-6590, télécopie (613) 564-6518).

Je vous remercie d'avance de votre support pour ce projet et je vous prie d'agréer l'expression de mes meilleurs sentiments.

A handwritten signature in black ink, appearing to read 'Jérôme', with a large, stylized flourish above it.

Jérôme Doutriaux, professeur
téléphone (613) 564 6590; télécopie (613) 564 6518

- ci-joints:
- résumé de nos objectifs de recherche
 - questionnaire avec une feuille optionnelle de renseignements personnels
 - une enveloppe de retour pré-affranchie

OBJECTIFS DE RECHERCHE

Quelles sont les questions le plus souvent posées par les entrepreneurs canadiens? Pour le savoir nous avons interrogé 27 présidents d'entreprises en micro-électronique et systèmes de communication et obtenu les résultats suivants:

Comment ont fait ceux qui réussissent?

Vaut-il mieux se débrouiller tout seul ou se joindre à d'autres?

Selon les chercheurs, quelle est l'importance des activités de recherche et développement?

Comment peut-on renforcer les activités de marketing?

Cette étude longitudinale d'entreprises canadiennes à technologie avancée au cours de la période 1986-1993 est centrée sur la seconde question, **vaut-il mieux se débrouiller tout seul ou se joindre à d'autres**, évaluant le succès des entreprises en fonction de facteurs tels que:

* recours à des accords de collaboration	* orientation vers le marché
* activités de recherche et développement	* type de stratégie
* conditions de démarrage	* développement des exportations
* style de gestion	* stage de développement de l'entreprise

En 1986, 72 entreprises canadiennes à technologie avancée ont participé à une enquête dont les résultats ont été publiés¹. En 1993, une autre étude a suivi, basée sur les 56 entreprises qui ont pu être localisées. Des entrevues téléphoniques avec vingt sept de ces 56 entreprises ont mené aux conclusions préliminaires suivantes:

1. Les "survivants" (les 56 entreprises qui ont pu être localisées) étaient plus actifs en recherche et développement et plus orientés vers l'exportation au début des années 1980 que les entreprises qui semblent avoir disparu depuis l'étude de 1986 (déménagement, rachat, faillite,...).
2. Les entreprises utilisant des stratégies internes d'innovation et de recherche et développement semblent mieux réussir que les autres, selon l'estimation de leurs présidents.
3. Les entreprises qui avaient des accords de collaboration en marketing avec d'autres entreprises ont eu un taux de croissance supérieur à celles qui n'avaient pas de tels accords.
4. La stratégie typique utilisée par les entrepreneurs pour s'adapter aux changements économiques a été un recentrage sur un nombre réduit de produits et de technologies et le développement des marchés d'exportation.

CE QUESTIONNAIRE EST ENVOYÉ A PLUS DE 1000 ENTREPRISES CANADIENNES A TECHNOLOGIE AVANCÉE afin d'avoir une base fiable pour répondre à certaines des questions que se posent des cadres d'entreprises canadiennes. Nous apprécions votre support et nous espérons que vous trouverez les résultats utiles (juin 1994).

1. Doutriaux J., 1991, "High-Tech Start-ups, Better Off with Government Contracts than with Subsidies", *IEEE Transactions on Engineering Management*, 1991, V.38, N.2, pp. 127-135.

Doutriaux J., 1992, "Emerging High-Tech Firms: How Durable are their Comparative Start-up Advantages?", *Journal of Business Venturing*, V. 7, N. 4, pp. 303-322.

Doutriaux J., 1991, "Effect of Initial Marketing and R&D Orientations on High-Tech Entrepreneurial Start-ups", *Journal of Small Business and Entrepreneurship*, V. 8, N. 4, July -September, pp. 9-27.



Stratégies collaboratives et Performance: Le cas des entreprises émergentes

*** Une enquête auprès des chefs d'entreprises canadiennes ***

--Hiver 1994--

L'objectif de ce projet de recherche, effectué sous la direction du professeur Jérôme Doutriaux de l'Université d'Ottawa, est d'analyser l'effet de stratégies de collaboration externes sur la performance d'entreprises émergentes à haute technologie.

Un résumé des résultats sera envoyé à tous les participants qui renvoient la "fiche de renseignements personnels" ci-jointe ou qui en font la demande sous pli séparé

Ce questionnaire, ****confidentiel une fois rempli****, ne devrait pas prendre plus de 25 minutes de votre temps. Si vous avez des questions ou des commentaires, n'hésitez pas à prendre contact avec le professeur Doutriaux à l'Université d'Ottawa, Ottawa, Ontario K1N 6N5 (tél. (613) 564-6590, FAX (613) 564-6518).

Première section -- Accords de coopération

1. Au cours des années 1985-1993, votre entreprise est-elle entrée dans des accords de coopération¹ avec d'autres entreprises?

☐ Non ☐ Oui (Si "oui", veuillez passer directement à la question 3)

2. Si "Non" veuillez cocher toutes les réponses appropriées ci-dessous et passer directement à la question 4, page 2.

- ☐ Nous sommes intéressés, mais aucune bonne opportunité ne s'est présentée
- ☐ Nous n'avons pas besoin d'aide ou de ressources externes
- ☐ Nous avons déjà assez à faire chez nous.
- ☐ Nous ne sommes pas intéressés
- ☐ Autre (veuillez préciser) _____

3. Si vous êtes entré dans des accords de coopération au cours des années 1985-1993, veuillez répondre aux questions qui suivent, un accord par colonne: S'il y a plus de cinq accords, veuillez photocopier les pages 1 et 2.

<u>Accord</u>	<u>- 1 -</u>	<u>- 2 -</u>	<u>- 3 -</u>	<u>- 4 -</u>	<u>- 5 -</u>
<u>Année conclue:</u>	_____	_____	_____	_____	_____
<u>Type:</u>					
"Joint Venture"	☐	☐	☐	☐	☐
Partenariat formel	☐	☐	☐	☐	☐
Partenariat informel	☐	☐	☐	☐	☐
Licence	☐	☐	☐	☐	☐
Autre (veuillez préciser)	☐	☐	☐	☐	☐

Objectifs:

Développer des marchés existant ☐	☐	☐	☐	☐
Établir de nouveaux marchés ☐	☐	☐	☐	☐
Au Canada ☐	☐	☐	☐	☐
Aux États Unis ☐	☐	☐	☐	☐
En Europe ☐	☐	☐	☐	☐
En Asie du Sud-Est ☐	☐	☐	☐	☐
Dans un autre pays ☐	☐	☐	☐	☐
Améliorer des produits existants ☐	☐	☐	☐	☐
Développer de nouveaux produits				
reliés à nos produits actuels ☐	☐	☐	☐	☐
non reliés à nos produits actuels ☐	☐	☐	☐	☐
Développer une capacité technologique				
de base ("recherche") ☐	☐	☐	☐	☐
Améliorer notre situation financière ☐	☐	☐	☐	☐
Améliorer nos capacités de production ☐	☐	☐	☐	☐
Améliorer notre systèmes de distribution ☐	☐	☐	☐	☐
Autre (veuillez préciser) ☐	☐	☐	☐	☐

Durée: La durée de cet accord était-elle:

Fixée ☐	☐	☐	☐	☐
Ouverte, avec processus de révision formel ☐	☐	☐	☐	☐
Ouverte, sans processus de révision ☐	☐	☐	☐	☐

¹ Dans cette étude, un accord de coopération est défini comme une entente formelle ou informelle entre deux ou plus de deux entreprises afin de réaliser ou de développer certaines activités fonctionnelles, chaque entreprise conservant son statut légal.

Les accords de coopération incluent donc "joint ventures", vente (licence) de brevets, alliances stratégiques. Ils n'incluent pas les fusions d'entreprises, acquisitions, ou du travail effectué sous contrat.

	- 1 -	- 2 -	- 3 -	- 4 -	- 5 -
Accord (suite)					
Niveau de formalisation: Les objectifs, rôles et attentes de l'accord étaient-ils:					
Bien définis	☐	☐	☐	☐	☐
Définis dans les grandes lignes	☐	☐	☐	☐	☐
Vagues et ouverts	☐	☐	☐	☐	☐
Les objectifs, rôles et attentes de l'accord ont-ils été précisés dans un contrat écrit formel? (✓ = Oui)	☐	☐	☐	☐	☐
Expérience passée: Avez-vous déjà de l'expérience dans ce type d'accord? (✓ = Oui)	☐	☐	☐	☐	☐
Localisation du siège social de votre partenaire:					
Province canadienne ou pays:	_____	_____	_____	_____	_____
Taille du partenaire, par rapport à votre entreprise:					
Beaucoup plus petit	☐	☐	☐	☐	☐
Plus petit	☐	☐	☐	☐	☐
Taille similaire	☐	☐	☐	☐	☐
Plus grand	☐	☐	☐	☐	☐
Beaucoup plus grand	☐	☐	☐	☐	☐
Caractéristiques du partenaire (indiquez tout ce qui s'applique)					
-Il a une ligne de produits	☐	☐	☐	☐	☐
-Il a plusieurs lignes de produits	☐	☐	☐	☐	☐
-C'est un leader en technologie	☐	☐	☐	☐	☐
-Il a des marchés bien établis	☐	☐	☐	☐	☐
dans un seul pays	☐	☐	☐	☐	☐
dans plusieurs pays	☐	☐	☐	☐	☐
Antécédents avec cette entreprise: Avez-vous eu d'autres accords de coopération avec cette entreprise? (✓ = Oui)	☐	☐	☐	☐	☐
Niveau de succès: Les objectifs fixés au début de l'accord ont-ils été satisfaits?					
Encore mieux que prévu	☐	☐	☐	☐	☐
Complètement	☐	☐	☐	☐	☐
Presque complètement	☐	☐	☐	☐	☐
En partie	☐	☐	☐	☐	☐
Pas du tout	☐	☐	☐	☐	☐
Ne s'applique pas (trop tôt)	☐	☐	☐	☐	☐
Effet de l'accord de coopération: entrez "P" pour Positif/bon, "A" pour Aucun/neutre, "N" pour Négatif/mauvais:					
-sur les ventes	_____	_____	_____	_____	_____
-sur votre position compétitive	_____	_____	_____	_____	_____
-sur vos capacités technologiques	_____	_____	_____	_____	_____
Facteurs qui pourraient avoir réduit l'efficacité de l'accord de coopération (cochez une ou deux réponses seulement):					
Manque d'engagement du partenaire	☐	☐	☐	☐	☐
Notre manque d'engagement	☐	☐	☐	☐	☐
Mauvais choix de partenaire	☐	☐	☐	☐	☐
Manque de compréhension entre les entreprises	☐	☐	☐	☐	☐
Disparition de l'opportunité sur laquelle était basé cet accord	☐	☐	☐	☐	☐
Changements dans nos objectifs	☐	☐	☐	☐	☐
Autre (veuillez préciser)	☐	☐	☐	☐	☐
Mondialisation: votre décision de vous lancer dans cet accord a-t'elle été influencée par (ou en prévision de...): (✓ = Oui):					
-l'accord de libre échange Canada-Etats Unis (1988)	☐	☐	☐	☐	☐
-l'accord de libre échange Nord-Américain (1992)	☐	☐	☐	☐	☐

Seconde section -- Votre entreprise en 1985-86, 1988-89 et maintenant

4. Quelles étaient les principales forces et limitations de votre entreprise? Écrivez F pour une force, L pour une limitation (faiblesse) aux lignes appropriées ci-dessous.

	en 85-86	en 88-89	en 92-93
Expertise technologique	_____	_____	_____
Expertise en R&D	_____	_____	_____
Expertise en marketing	_____	_____	_____
Affaires financières	_____	_____	_____
Système de distribution	_____	_____	_____
Fabrication	_____	_____	_____
Expérience internationale	_____	_____	_____
Autre (Veuillez préciser)	_____	_____	_____

5. Lequel des comportements suivants est le plus typique de votre entreprise? (Cochez un seulement par période)
- | | en 85-86 | en 88-89 | en 92-93 |
|--|--------------------------|--------------------------|--------------------------|
| -Recherche de marchés, développement de technologies ² pour nos idées de nouveaux produits ³ | ☐ | ☐ | ☐ |
| -Développement de produits et de marchés basés sur notre expertise technologique | ☐ | ☐ | ☐ |
| -Évaluation de ce que les clients veulent et ensuite développement de produits et technologies basés sur leurs besoins | ☐ | ☐ | ☐ |

6. Stage de développement - Laquelle des descriptions suivantes correspond le mieux à votre entreprise ? (un choix seulement)
- | | en 85-86 | en 88-89 | en 92-93 |
|--|----------|----------|----------|
|--|----------|----------|----------|

- | | | | |
|---|--------------------------|--------------------------|--------------------------|
| -premier produit et marché en cours de développement, recherche de ressources financières | ☐ | ☐ | ☐ |
| -produit bien développé, prêt pour production et vente, marché pas encore établi; quelques ventes et commandes | ☐ | ☐ | ☐ |
| -une ligne de produit, croissance rapide des ventes; on veut maintenant produire profitablement en grand volume | ☐ | ☐ | ☐ |
| -intéressé au développement de la 2e ou 3e génération de produits et de nouvelles lignes de produits | ☐ | ☐ | ☐ |
| -avons plusieurs lignes de produits; voulons pénétrer nouvelles régions | ☐ | ☐ | ☐ |
| -Autre (veuillez expliquer) _____ | ☐ | ☐ | ☐ |

7. Ventes et emploi. Veuillez répondre à la question 7.1 ou, si vous préférez, à 7.2.

- 7.1 Veuillez donner le niveau des ventes et le nombre d'employés au cours des périodes indiquées:

Année	1985-86	1989-90	1992-93
Ventes (milliers de dollars)	_____	_____	_____
Nombre d'employés	_____	_____	_____

- OU 7.2 Veuillez indiquer dans quel intervalle se trouvaient vos ventes en 1985-86, le rapport des ventes pour les périodes indiquées, ainsi que votre nombre d'employés.

niveau des ventes en 1985-86: ☐ moins de 200K ☐ 200-499K ☐ 500-999K
☐ 1000-4999K ☐ 5000K et plus

Ratio, ventes de 1989-90 sur celles de 1985-86: _____ # d'employés, 1985/86: _____
 Ratio, ventes de 1992-93 sur celles de 1989-90: _____ # d'employés, 1989/90: _____
 Ratio, ventes de 1992-93 sur celles de 1985-86: _____ # d'employés, 1992/93: _____

8. Distribution géographique des ventes (en pourcentage de leur valeur):
- | | 1985-86 | 1989-90 | 1992-93 |
|-------------------------------------|---------|---------|---------|
| La région où est notre siège social | _____ | _____ | _____ |
| Reste du Canada | _____ | _____ | _____ |
| U.S.-Mexique | _____ | _____ | _____ |
| Reste du monde | _____ | _____ | _____ |
| Total | 100% | 100% | 100% |

9. Évaluation subjective de la performance de l'entreprise: pour chaque année, indiquez TM (très mauvaise), M (mauvaise), A (acceptable), B (bonne), TB (très bonne), ou E (excellente) 1985-86: _____ 1989-90: _____ 1992-93: _____

10. Dépenses et nombre d'employés en recherche et développement (% du total)

Année	1985-86	1989-90	1992-93
- dépenses en R&D (% des ventes)	_____	_____	_____
- % des dépenses de R&D utilisées sur des technologies de base plutôt que sur nos produits <u>actuels</u> :	_____	_____	_____
- employés en R&D (% du nombre total d'employés):	_____	_____	_____

11. Importance relative de diverses sources d'information et d'idées nouvelles: rang d'importance (le plus important = 1; le moins important = 10):

	Technologie	Nouveaux Produits	Marchés
Réseau personnel	_____	_____	_____
Clients	_____	_____	_____
Fournisseurs	_____	_____	_____
Littérature technique	_____	_____	_____
employés de R&D et génie	_____	_____	_____
employés de marketing	_____	_____	_____
association professionnelle/technique	_____	_____	_____
Partenaires industriels	_____	_____	_____
Partenaires commerciaux	_____	_____	_____
Autre (veuillez préciser) _____	_____	_____	_____

² Dans ce questionnaire, une *technologie* est définie comme un ensemble de connaissances et d'idées incarnées dans le produit ou service, ou dans la production de ce produit ou service.

³ Le terme *produit* est utilisé dans ce questionnaire pour représenter la source principale des revenus de votre entreprise; un *produit* peut donc être un produit, une ligne de produits, ou un service. Une *ligne de produits* est définie comme un ensemble de produits similaires ou complémentaires.

12. Style de gestion: veuillez indiquer sur les échelles ci dessous (avec un "x") où se trouvait et se trouve votre entreprise, avec: 1 = Le président/entrepreneur est au centre de toutes les fonctions, communications et décisions importantes;

10 = L'entreprise est dirigée par une équipe avec grande délégation des décisions.

<u>en 85-86</u>	1	5	10
<u>en 89-90</u>	1	5	10
<u>en 92-93</u>	1	5	10

13. Domaine principal d'activité de l'entreprise: S = software/logiciel, E = électronique (équipement, hardware), T = télécommunications, DS = étude de systèmes (systems design), A = autre: _____;
en 85-86: _____ en 89-90: _____ en 92-93: _____

14. Structure de votre industrie: Lequel décrit le mieux votre industrie, au Canada et internationalement?

<u>Année</u>	<u>en 1985-86</u>		<u>en 1992-93</u>	
<u>Région</u>	<u>CND</u>	<u>Monde</u>	<u>CND</u>	<u>Monde</u>
Beaucoup de petites et moyennes entreprises	—	—	—	—
Une grosse entreprise et beaucoup de petites	—	—	—	—
Quelques grosses firmes et beaucoup de petites	—	—	—	—
Quelques petites entreprises	—	—	—	—
Une seule firme dans ce marché spécialisé	—	—	—	—
Autre, veuillez expliquer _____	—	—	—	—

15. Lequel des stades suivants décrit le stade de développement de l'industrie dans laquelle vous vous trouvez:

	<u>en 85-86</u>	<u>en 89-90</u>	<u>en 92-93</u>
Émergente	—	—	—
En croissance	—	—	—
Mature, adulte	—	—	—
En déclin	—	—	—

16. Quelle est la position compétitive de votre firme dans votre industrie au niveau mondial au cours des périodes indiquées?

	<u>en 85-86</u>	<u>en 92-93</u>
Toute seule, pas de compétition	—	—
Leader, chef de file	—	—
Suiveur, "follower"	—	—
Suiveur distant, "distant follower"	—	—

Le démarrage de votre entreprise (...Dans la mesure de ce que vous en connaissez)

17. Année de création 19_____

18. Type de création: ☐ firme indépendante, entrepreneuriale ☐ Filiale ☐ "Joint Venture"

19. Si votre entreprise est cotée en bourse, en quelle année cela s'est-il fait? 19_____

20. Si votre entreprise a été sujette à des changements organisationnels/corporatifs important (fusion, rachetée...), veuillez décrire l'événement et l'année:

Année: _____ événement: _____
 Année: _____ événement: _____
 Année: _____ événement: _____

21. Nombre de fondateurs: _____

Nombre de fondateurs qui sont encore attachés à l'entreprise? _____

22. Ventes, années 1 et 2 (somme des deux années, milliers de dollars): _____ (1000 \$)

Ratio, dépenses R&D sur ventes, moyenne année 1 et 2: _____ %

Ratio, exportations sur ventes totales, moyenne année 1 et 2: _____ %

Ratio, ventes au secteur public sur ventes totales, moyenne année 1 et 2: _____ %

Pourcentage moyen, années 1 et 2, revenus résultant de la vente de produits plutôt que de services ou d'investissements: _____ %

23. Expertise de l'équipe de fondateurs au moment du démarrage: Bas Moyen Haut très Haut

en marketing	☐	☐	☐	☐
en finance	☐	☐	☐	☐
en gestion/management	☐	☐	☐	☐
en R&D	☐	☐	☐	☐

Avec nos remerciements les plus sincères pour votre temps

Une fois rempli, veuillez renvoyer ce questionnaire dans l'enveloppe pré-adressée pré-affranchie ci jointe à:

Professeur Jérôme Doutriaux, Université d'Ottawa, Faculté d'Administration,

136 Jean-Jacques Lussier, Ottawa, Ontario K1N 6N5, Tél: (613) 564-6590 Télécopie: (613) 564-6518

Stratégies collaboratives et performance: Le cas des entreprises émergentes

***** Une enquête auprès des chefs d'entreprise canadiennes *****

--Hiver 1994--

Renseignements personnels

*****Optionnel*****

Nom: _____

Titre/Responsabilité: _____

Nom de votre entreprise: _____

Adresse: _____

Téléphone: ()

Télécopie: ()

* Si vous désirez recevoir une copie de l'analyse (Juin 1994), veuillez nous renvoyer cette fiche, ou, si vous le préférez, nous envoyer une demande sous pli séparé.

Accepteriez-vous de participer à une étude plus approfondie de votre entreprise afin de nous permettre de préparer une étude de cas utile pour l'enseignement et la recherche ? ☐ Oui ☐ Non

Avec tous nos remerciements pour le temps passé à remplir ce questionnaire.

**Veuillez nous renvoyer le questionnaire dûment complété
dans l'enveloppe pré-adressée et pré-affranchie ci-jointe et l'envoyer à:**

**Professeur Jérôme Doutriaux
Université d'Ottawa
Faculté d'Administration
136 Jean-Jacques Lussier, Ottawa, Ontario K1N 6N5
Tél: (613) 564-6590 Télécopie: (613) 564-6518**

APPENDIX 2

APPENDIX A

RP0610 BUSINESS OPPORTUNITIES SOURCING SYSTEM DATE 1991/06/12
COMPANY PROFILE REPORT

ESTABLISHMENT INFORMATION

NUM: 103249110000

TYPE: APPROVED

NAME:

ADDRESS:

ABC FARM EQUIPMENT OPERATIONS
1260 CLARANCE ST.
WINNIPEG, MAN.
R3C 4E8

POSTAL ADDRESS:

P.O. BOX 7300
WINNIPEG, MAN.
R3C 4E8

TELEPHONE: 204-477-2332
TELEX: 07-057334

FACSIMILE NUMBER: 204-284-9487
TELEX ANSWERBACK: ABCFARM

PARENT COMPANY NAME: FARM HOLDING INC.

ALTERNATE NAMES: VERSATILE FARM

ALIAS NAMES:

BOSS INFORMATION - MANUFACTURER

NUM:103249110000

EXECUTIVE OFFICER:
EXPORT MANAGER:
CONTACT:

MR. PAUL M. SOURBY
MR. ROBERT WALSH
MR. JOHN SHELL

----- DATES -----
MAILED: 1990 08 01
COMPLETED: 1990 08 02
RECEIVED: 1990 08 14

----- STAFF -----
FULL TIME: 1000+
PRODUCTION: 500 - 999
ENGINEERING: 20 - 49

----- FOREIGN -----
LICENSING: YES
SUBSIDIARIES: NO

----- SALES (\$000) -----
TOTAL ANNUAL: \$50,000+
ANNUAL EXPORT: \$50,000+

AWAITING UPDATE: NO
YEAR ESTABLISHED: 1963
EXPORTER: YES
INTEREST IN EXPORT: YES
LANG. PREFERENCE: ENG
PARENT COUNTRY.....UNITED STATES

EDITOR: E9008R
YEARS IN BUSINESS: 27
YEARS EXPORTING: 18
CANADIAN LICENSING: YES
R & D DEPARTMENT: YES

DIVISIONS: 37 AGR, CONST, MATERIALS HANDLING EQU & MACH.

COUNTRIES EXPORTING TO:

UNITED STATES, AUSTRALASIA, SAUDI ARABIA, SUDAN, SENEGAL,
UNION OF SOVIET SOCIALIST REPUBLIC, MEXICO, IVORY COAST,
KENYA, ARGENTINA, FRANCE, SWEDEN, ITALY, COLOMBIA, GHANA

REGIONS EXPORTING TO:
NORTH AMERICA, AUSTRALASIA, COMMONWEALTH, PACIFIC RIM COUNTRIES,
MIDDLE EAST OR NEAR EAST, ASIA OR FAR EAST, ARABIC COUNTRIES,
PERSIAN GULF, AFRICA, EASTERN BLOCK (EUROPE), EUROPE, LATIN
AMERICA, SOUTH AMERICA, WESTERN EUROPE, EUROPEAN COMMON MARKET
COUNTRIES, MEDITERRANEAN COUNTRIES, SCANDINAVIA, UNITED KINGDOM

COUNTRIES INTERESTED IN:
WORLDWIDE

REGIONS INTERESTED IN:
WORLDWIDE

US STATES EXPORTING TO:
CONNECTICUT, MAINE, MASSACHUSETTS, NEW HAMPSHIRE, RHODE
ISLAND, VERMONT, NEW JERSEY, NEW YORK, PENNSYLVANIA, ILLINOIS,
INDIANA, MICHIGAN, OHIO

US RGNS EXPORTING TO:
NEW ENGLAND, MIDDLE ATLANTIC STATES, EAST NORTH CENTRAL STATES

BOSS PRODUCTS - MANUFACTURER

NUM: 103249110000

<u>CODE</u>	<u>EXP</u>	<u>AUTO</u>	<u>DESCRIPTION</u>
5213520	Y		BACKHOE & FRONT END LOADER, COMB, INTEG DSG
5213683	Y		BUCKET, FRONT END LOADER, INDUSTRIAL
5434020	Y		SWATHERS AND WINDROWEERS, AGRICULTURAL, NEW
5437220			COMBINES, PULL TYPE, NEW
5511910	Y		TRACTORS, WHEEL, MULTI-PURPOSE, NEW, NES