

The · Art · and Science · of Entrepreneurship

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THE ART AND SCIENCE OF ENTREPRENEURSHIP

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BALLINGER PUBLISHING COMPANY
Cambridge, Massachusetts
A Subsidiary of Harper & Row, Publishers, Inc.

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International Standard Book Number: 0-88730-070-7

Library of Congress Catalog Card Number: 85-22843

Printed in the United States of America

Library of Congress Cataloging in Publication Data

Main entry under title:

The Art and science of entrepreneurship.

Papers from a conference held in February 1985 sponsored by the RGK Foundation, the IC² Institute at the University of Texas at Austin, and the Center for Entrepreneurship at Baylor University.

Includes index.

1. New Business enterprises—Congresses.
2. Entrepreneur—Congresses. I. Sexton, Donald L. II. Smilor, Raymond W. III. RGK Foundation. IV. IC² Institute. V. Baylor University. Center for Entrepreneurship.

HD62.5.A78 1985 338'.04 85-22843
ISBN 0-88730-070-7

THE ART AND SCIENCE OF ENTREPRENEURSHIP

To Carol and Judy
Our entrepreneurial partners in life.

DS and RS

PREFACE

Entrepreneurship is one of the great social and economic forces of our time. The surge of interest in entrepreneurial activity reflects a transformation in American society that is characterized by a new wave of business and technological development. If we are truly to grasp the dimensions of this transformation, it is necessary to understand better the dynamics of the entrepreneurial process and to integrate more effectively the theory and practice of entrepreneurship. This was the consensus that emerged from the conference on which this volume is based—State-of-the-Art in Entrepreneurship Research. The conference was sponsored by the RGK Foundation, the IC² Institute at the University of Texas at Austin, and the Center for Entrepreneurship at Baylor University, in February 1985.

Entrepreneurship requires the fusion of talent, ideas, capital, and know-how. This fusion process can be risky, uncertain, and sometimes haphazard but is always dynamic. What emerges from the papers in this volume is that an examination of this process shows entrepreneurship to be both an art and a science. Increasing an understanding of the art and science of entrepreneurship is the purpose of this book.

Only through communication of research activities can the emerging field of entrepreneurship be broadened to attract new researchers with new ideas, new approaches, and new methodologies that, in turn, can enhance the prospects of success for entrepreneurial ven-

tures. This book, therefore, presents state-of-the-art work in entrepreneurship by leading scholars in an effort to convey what is known about the field, what is not known, and what needs to be done to push the frontiers of research and remain on the cutting edge.

Several conclusions about the current state-of-the-art are readily apparent. First, entrepreneurship is in the early stages of a rapid growth cycle in both industry and academia. How far and how fast the area expands will be a function of our ability to analyze and explain the techniques, interfaces, and causal relationships that exist and are expected to occur.

Second, not all areas have progressed at the same rate. Consequently, while some areas have reached advanced stages, others are still in the exploratory stages.

Third, there is an unfilled obligation to develop convergent theories that provide an overall understanding of the entire entrepreneurial process rather than specific narrow areas and to convey this perspective to a broader audience.

Finally, the study of entrepreneurship has a much more important function than the satisfaction of intellectual curiosity. Basic research must lead to applications in industry and in the public as well as the private sector. State-of-the-art advancements must occur both in academia and in business concurrently for one area to further the body of knowledge in the other. Only in this way can we more effectively link theory with practice and more completely appreciate the art and science of entrepreneurship.

ACKNOWLEDGMENTS

This book is the result of the support, encouragement, and entrepreneurial spirit of many people and organizations.

Dr. George Kozmetsky, director of the IC² Institute at the University of Texas at Austin, uniquely combines the finest qualities of the scholar and the practitioner. Without his vision, commitment to research in entrepreneurship, and dedication to linking theory with practice, this book would not have been possible.

Ronya Kozmetsky, president of the RGK Foundation, provided invaluable support for the conference. Her entrepreneurial ability to get things done is surpassed only by her commitment to the educational process.

We wish to thank Linda Teague and Margo Latimer of the IC² Institute for their untiring assistance in preparing for the conference. We are particularly grateful to Cynthia Smith of the RGK Foundation, who provided invaluable administrative support.

Elaine Chamberlain of the IC² Institute deserves special recognition. She handled conference logistics with élan, solved problems with incredible efficiency, and provided key assistance in helping to compile the manuscript.

We are indebted to the RGK Foundation, the IC² Institute, and the Baylor Center for Entrepreneurship. Their ongoing commitment to research and education was the driving force behind the conference and this book.

We want to express our appreciation to Carol Franco, president of Ballinger Publishing Company, for her interest and encouragement, and to David Barber, our editor, for his important help in preparing the manuscript for publication.

We are very grateful to the scholars whose contributions make up this volume.

Finally, each of us wishes to thank his coeditor for making the work on the conference and this book such an enjoyable and productive entrepreneurial adventure.

INTRODUCTION

Kevin Farrell, the Washington Bureau Chief of *Venture Magazine*, in his article in the February 1985 issue titled "There's No Stopping Now," echoed the feelings of many people in the field with his lead statement: "By almost any measure, the 1980's are shaping up as the most entrepreneurial decade in U.S. history." Others quoted in the same article were Donald Burr, CEO of People Express, who said, "We're on the edge of a new golden age that will make previous [entrepreneurial] endeavors look small," and James Botkin, a partner in the Technology and Strategy Group, who declared, "The entrepreneurial explosion will continue through this decade and, quite possibly, to the end of the century. What we are seeing now is really just the beginning."

This volume provides leading edge research in this exciting and growing field of entrepreneurship. Clearly, entrepreneurship has been established as a significant area of inquiry and as an important academic discipline. To address key theoretical and practical issues related to entrepreneurship, this volume is divided into five parts: entrepreneurship characteristics; risk and venture capital financing; high-tech entrepreneurship; growth and entrepreneurship; and research and education.

Part I emphasizes the social as well as the psychological dimensions of entrepreneurship. Howard Aldrich and Catherine Zimmer stress that entrepreneurship is embedded in a social context. Using

the population perspective on organizational change, they illustrate the application of network analysis concepts to the study of entrepreneurship. They explore four applications: forces increasing the diversity of networks, increasing reachability through broker roles, the effects of network diversity, and the significance of the resources embedded in entrepreneurial networks.

Robert Brockhaus and Pamela Horwitz examine the psychology of the entrepreneur. They review possible psychological characteristics, assess the effects of demographics (such as age and education), and consider previous business and personal experience. They grapple with various definitions of the term "entrepreneur." They also discuss risk-taking propensity and innovation, need for achievement, locus-of-control beliefs, problem-solving ability and style as well as the interaction of these elements with environmental factors. As an extension of this discussion, Yvonne Gasse suggests a belief-based approach for identifying entrepreneurial potential.

Finally, Robert Hisrich maintains that the risk of failure is perhaps greater for the woman entrepreneur. Not only does she confront all the usual business problems but she also must handle a range of problems associated with being a woman in a traditionally male-dominated arena. Hisrich examines the experiences, problems, and successes of women entrepreneurs. He seeks to provide a framework for understanding this individual who is willing to juggle her life between work and family as well as between work and marriage to create a new venture that will provide independence and satisfaction.

Part II demonstrates the important roles of risk and venture capital financing in supporting entrepreneurial activity. William Wetzel traces the history of risk capital research from its post-World War II infancy to 1984 and concludes with a discussion of aspects of informal risk capital investing that offers opportunities for future research. Albert Bruno provides a structural analysis of the venture capital industry to show similarities and differences to informal risk capital.

David Brophy extends the perspective on venture capital. The reports on recent developments in the venture capital market reviews selected venture capital research and indicates potentially fruitful areas of research activity. Herbert Kierulff furthers the discussion by commenting on the role that other disciplines may play in extending the frontiers of research on venture capital.

Part III explores the emerging area of high-tech entrepreneurship. Arnold Cooper reviews recent empirical studies to determine factors

related to the founding of high-technology firms. He focuses on the characteristics of high-tech entrepreneurs, relationships to incubator organizations, and environmental factors that shape the climate for entrepreneurship. Modesto Maidique studies two related literature streams: new product and new venture success/failure; and research on corporate excellence. He then points to key success factors in the development of high-tech ventures.

Pier Abetti and Robert Stuart review state-of-the-art knowledge on the interrelationships between innovation, technology transfer, and entrepreneurship. They examine two case studies that illustrate the role of the entrepreneur in ensuring effective vertical and horizontal technology transfer with the scientific/technological environment and with the marketplace. In extending the discussion on technology transfer, Donald Myers focuses on the need for a champion of technological innovation and the potential limitations of transferring the role of the champion during the innovation cycle.

Part IV looks at issues associated with corporate entrepreneurship and with maintaining the benefits of entrepreneurial approaches as a company grows larger. Jeffry Timmons emphasizes three driving forces in creating fast-growth, high-potential ventures: the makeup of the founding team; the assessment of the opportunity; and the assembling of the resources necessary for implementation. The challenge is to choose the right mix of these factors depending on circumstances and aspirations.

Ian MacMillan reviews the research literature on corporate venturing. He then focuses on the major strategic and management factors that appear to affect venture success most directly: strategy, structure, planning and control, staffing and reward systems. In response, John Hornaday points to the need for the higher order development of generalizations, theoretical constructs, and "laws" of causal linkages in corporate entrepreneurship ventures.

Part V emphasizes emerging developments in and important needs for research and education in entrepreneurship. Max Wortman develops an interface framework for entrepreneurship and small business and formulates typologies for research in these areas.

Neil Churchill and Virginia Lewis use a four-dimensional classification scheme to examine research in entrepreneurship: research methodology, objective of research, research topic, and the centrality of the study to core problems and issues in entrepreneurship. They find that the research was not closely focused on any small set

of topics, that there was a concentration on two methodologies, that both topic and methodology varied considerably depending on whether the study was reported in a journal or a conference proceeding, that the objective of the research was one-third on improving theory and two-thirds on improving practice, and that there was a reasonable degree of centrality present but with room for improvement.

In response, Alan Carsrud, Kenneth Olm, and George Eddy critique the operational definitions for entrepreneurship. They emphasize the need for systematic, empirical research and then suggest a multidimensional model that focuses on the interaction of both micro- and macro-organizational variables that influence entrepreneurial success.

Karl Vesper assesses trends in the number and variety of courses on entrepreneurship, course composition, and class composition. He then reviews extracurricular activities and raises questions that could benefit from more methodological research. In response, Howard Stevenson reports on the recent reemphasis on entrepreneurship at the Harvard Business School. He argues that success will come only if there is balanced progress in four areas: teaching, course development, research, and faculty development.

A number of key general points emerge from these papers. The methodology or means by which hypotheses are proven or disproven, leading to the development of constructs, paradigms, and theories, is an area that requires further development or sophistication as the body of knowledge on entrepreneurship expands. At any point in time in the search for knowledge, the measurement techniques, test instruments, and quantitative methods may range from simple to sophisticated. This occurs because various aspects in the search for knowledge have not progressed at the same rate. Consequently, the need for improved methodological approaches are never completely satisfied. However, this does not mean that researchers should become complacent with current or existing approaches. Rather, they should search for more sophisticated techniques as required by a higher level of research effort.

There is a need for longitudinal studies to provide information that expands the time horizon of the study from a single slice in time to one where the impact of decisions over time can be analyzed. Unfortunately, longitudinal studies require significant periods of time, and in some situations the body of knowledge expands to obviate

the needs of the study. Nevertheless, the need for longitudinal studies to evaluate the impact of decisions or changing dimensions over time remains. Specifically, within the area of psychological characteristics, new venture decisions, and the impact of the new ventures on the economic development of an area still represent valid areas in which longitudinal studies are needed to answer ongoing research issues.

Two research issues are of major concern: the development of models that illuminate the interrelationships of the various components of entrepreneurship and the development of a comprehensive theoretical framework. Researchers must now accept as a portion of each research the responsibility to convey the relationship of the particular research to other components and its application to the development of a conceptual framework. These issues are of such importance that they cannot be relegated to one or two persons. What is needed is a cooperative approach with contributions from all serious researchers in the field.

In the area of research on entrepreneurs, we have now conducted a limited number of comparative studies, made inroads into the development and validation of new test instruments, started longitudinal studies, and provided new insights into the relationship between psychological characteristics and sociological factors. Much has been done recently with regard to new venture creation, risk capital, and venture capital. Given the enormous amount of growth in this area and the changing parameter of the field, however, there is need for more work.

In another area—that of the development of a significant data base—efforts are currently underway at Babson College and other organizations to accumulate the data base necessary for large-scale systematic longitudinal studies. Given these data bases, it can be expected that future research efforts will develop well beyond the limited sample sizes of the past.

In the area of venture creation research, a number of basic steps, stages, decision trees, and controversies have emerged. But there has been limited development of a predictive and causal model or set of models that can increase entrepreneurial success when the independent variables are manipulated in appropriate ways.

The interface between small business and entrepreneurship has been an ongoing concern. However, as the distinction between the two areas becomes more clearly defined and as the interface relation-

ships are identified, the relationships between small business, emerging business (entrepreneurship), and large business (corporate entrepreneurship) should provide fertile ground for research efforts.

The importance of entrepreneurship as an academic endeavor has increased substantially in the late five years. The number of new centers and programs under development has resulted in a shortage of senior faculty. Unless more new people can be developed more rapidly, future growth may be stymied. It is necessary, therefore, to assist others through not only a sharing of research but also other aspects that may not be classified as research.

Several specific issues of interest to researchers in the field of entrepreneurship emerge from these papers. With regard to the psychology of the entrepreneur, we are still lacking a generic definition and the development of effective psychological test instruments. There is acceptance of the fact that many entrepreneurs would never initiate their new ventures if their work environments afforded the opportunity for creative expression and innovative activities. The need for longitudinal studies that cover the gamut from aspiring to successful entrepreneurs still exists in order to understand the relationship of psychological traits to both the initiation and growth of the new venture. As suggested by Brockhaus and Horwitz and as supported by Wortman, it might be beneficial to redirect some research efforts in this area towards determining why entrepreneurs succeed or fail, their role in the organization, and their organizational behavior or management style.

The sociological aspects of venture initiation have been studied from both a specific and a broad policy approach. Through the specific studies, a broader conceptual approach can be developed. Aldrich and Zimmer describe the interplay between role models, action groups, and networks that has provided insights into a new research approach in this area.

The woman entrepreneur, an area open for research a few years ago, has now had her role, problems, and motivations more clearly defined in an effort by Hisrich. He provides a framework for understanding this person and for doing additional research.

Wetzel aptly describes the explosion in risk capital: "It is likely that more has been learned about risk capital in the last five years than was discovered in the previous twenty-five years combined." Even with this increased knowledge, informal risk capital has yet to emerge from the exploratory stage. We still do not know what concepts, theories, and hypotheses are relevant. As Wetzel states, "Op-

portunities to explore the role of individual risk capital investors are virtually without bounds."

The growth of venture capital has paralleled that of informal risk capital. The industry, as Brophy shows, has grown from a fragmented and informal market to one with identifiable components and processes. Venture capital investments have increased by about 155 percent in the last five years. The increased investments have been matched by an increased interest on the part of scholarly researchers. With the development of a comprehensive data base, the opportunity for internally consistent, multifaceted studies of the venture capital process over time are now available. With the data limitations being solved, the area is now ready for the application and adaptation of modern financial economic theories to the venture capital process. This area, like many others, appears to provide ample opportunities for researchers.

Recent research activity in new venture creation has moved beyond steps and stages to the development of models depicting the interrelationships between the founders, the opportunity, and the necessary resources. Further, the research has moved well beyond the creation stage and into the causal relationships associated with growth. This growth factor separates the new venture creation of a small business from the new venture creation of an entrepreneurial or emerging firm. Timmons concludes that "We now see that experience, thought, and action inform each other in the process of venture creation. The process of finding 'the fit' resists simple description, but it is easy to label: it is entrepreneurship."

The broad range of research activities ranging from the small business/entrepreneur interface to the entrepreneur in large corporations has seen considerable activity in the last five years; yet significant effort remains to be done. While the methodological approaches have advanced, we still tend to utilize indiscriminately surveys that do not seem to fit into a logical, coherent framework. The areas of entrepreneurs in government and nonprofit organizations, for the most part, remain virgin territories for research.

Wortman, in his comparative study of research typologies and research studies, notes a number of deficiencies in methodology. He suggests a framework for incorporating the fragmented studies into a theoretical model.

Corporate venture research has made significant strides. Like research in psychological characteristics, however, it is now limited by lack of agreement on fundamental definitions of scope and success.

These problems stand as serious barriers to the advancement of research in this area. A body of knowledge now exists such that, if the definitional problems can be resolved, it is expected that research in the area can move from descriptive material based on case analyses to more rigorous and well-designed studies.

MacMillan suggests the need for research that will explore the causal linkages between critical elements in corporate entrepreneurship, and he presents a model of levels of corporate ventures.

The areas of high-tech entrepreneurship and technology transfer are important areas of serious research. The dynamics of change in these areas is such that research into the impact of change, especially in environmental characteristics and in risk/reward relationships, is clearly needed. Innovation programs and incubator organizations are new to the scene, and our understanding of the role and impact of these structures on entrepreneurship needs to be more fully developed. These are especially important with regard to start-up operations and to their later patterns of performance.

In review of current research in this area, Cooper discusses the distinctive characteristics of high-technology entrepreneurs, their success factors, and their support systems. He also stresses the need for communicating the results of entrepreneurship research to other areas of academia.

Our understanding of the technology transfer process and of the innovation process from which new high-tech ventures are created needs to be expanded. Abetti and Stuart describe different approaches to these processes that have enhanced our understanding of the key factors for success. They provide insights into a growth area comparable to that of risk or venture capital.

Research methodology—our means of proving hypotheses and developing theories—according to Churchill and Lewis is not closely focused on any small set of topics, is not converging equally towards core issues and problems, varies considerably with the topics, and is more oriented toward improving practice than improving theory. At the same time, it does show a reasonable degree of centrality. They provide a convergent model for entrepreneurship research.

With regard to all research, there is a need to show the relationship between the individual research effort and a broader contextual framework. There is also a need to broaden the base in which research efforts are published. Many researchers have expressed concern that research efforts are not being broadly distributed to others outside the entrepreneurship community.