

# 1997 Award Winner Arnold C. Cooper's Contributions to Entrepreneurship and Small Business Research<sup>1</sup>

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*“Arnold Cooper’s pioneering work on technical entrepreneurship, new technology-based firms, and incubator organizations has significantly enhanced our understanding of entrepreneurial phenomena... Dr. Cooper is still inspiring a new generation of researchers in a field which today has become of major interest for policy makers all over the world.”*

The aim of this essay is to present the research of Arnold C. Cooper, the 1997 FSF-NUTEK Award Winner. Only research within the area of the Award will be presented. The presentation starts off with an introduction to the winner’s career and continues with an overview of the most important research contributions.

## Career in Brief

Arnold Cooper obtained his first degree in chemical engineering in 1955 at Purdue University, and in 1957 he was among the first batch of students from the Krannert School of Management at Purdue University to obtain a Master of Science in Industrial Management. Having left the university, he worked for a year at Procter & Gamble. In 1958 he went to Harvard Business School as a doctoral student. At Harvard, Arnold Cooper was influenced by W. Arnold Hosmer, who had developed a new course entitled “Small Manufacturing Enterprises”, and Arnold Cooper duly became his research assistant. Hosmer was interested in the dynamics of growth-oriented small firms – firms that could be found around Route 128 in Boston – and by studying these firms a great deal could be learned about wealth and new job creation. In 1962, Arnold Cooper presented his thesis *Practices and Problems in the Development of Techni-*

*cally Advanced Products in Small Manufacturing Firms* under the supervision of Arnold Hosmer. In keeping with the tradition of the Harvard Business School, the thesis was based on a number of case studies concerning the practices and problems of product development in small manufacturing companies.

Since the 1960s, Arnold Cooper has been one of the leading entrepreneurship scholars and can be considered as a pioneer in strategic management as well as in entrepreneurship research. His pioneering work on spin-offs in Silicon Valley and new technology-based firms has significantly enhanced our understanding of entrepreneurial phenomena. Cooper can also be said to be the archetype of an entrepreneurship researcher, as his research is wide-ranging, and for having attempted to find answers to many of the fundamental questions that define the research field. His contributions are not merely empirical but also methodological; he was, for example, one of the first scholars to carry out longitudinal studies of a large number of companies, and he has also made numerous theoretical contributions. Arnold Cooper’s strength is his ability to combine a strong theoretical base with good empirical research. Furthermore, he was one of the first entrepreneurship researchers to have his work published in the leading management journals, which is an indication of the quality of his research.

## Research Contributions

In this section some of Arnold Cooper’s extensive research is presented. The section is divided into four areas: R&D in small manufacturing firms, technical entrepreneurship, entrepreneurial diversity and entrepreneurship and performance.

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<sup>1</sup> This presentation covers Arnold C. Cooper’s main contributions to entrepreneurship and small business research until around the year 2003.

### ***R&D in Small Manufacturing Firms***

Arnold Cooper's interest in R&D in small manufacturing firms were first expressed in an article in *Harvard Business Review* "R&D Is More Efficient in Small Companies" (Cooper 1964), in which he raises the question "Is there a substantial difference in the cost of developing particular products among companies of different sizes?" The study was based on interviews and case studies of "parallel development projects" in which both a large and a small company had independently developed the same product. The case studies clearly showed differences in the way large and small companies undertook product development and also in the effects on development costs. Larger companies tended to spend substantially more time and money on the development of a particular product than did small firms.

Cooper argued that there are three major factors that may explain the advantages enjoyed by small firms. The first is the ability of the individual(s) responsible for product development – ability in terms of technical knowledge, creativity and the ability to see "the core of a problem". The average capabilities of technical staff are higher in small firms than in larger ones, which may be explained by the fact that many small research-based firms are able to attract outstanding technicians and that larger companies often hire a great number of inexperienced young engineers, whereas small firms typically employ people that have already demonstrated their technical competence in larger firms. The second factor concerns the attitude of technical staff. In small firms the staff members are more concerned about how much a project costs than their counterparts in larger companies. The reasons may be that the cost of a single project is more important in a small firm than in a larger one and that it is easier for technical people in small firms to relate to and have an awareness of the development of the business as a whole. Finally, communication and coordination tend to be easier and less costly in small firms. The results were controversial at the time of publication, and the editors of *HBR* asked the readers for their opinion on the conclusions of the article. The responses were extensive and mainly in favor of the conclusions.

However, few small firms are involved in R&D, and many people were pessimistic about the ability of small firms to develop significantly advanced new products – truly innovative and R&D-intensive activities should be left to the large companies. In a follow-up article "Small Companies Can Pioneer New Products" in *HBR* (Cooper 1966), Arnold Cooper addressed some of these issues. This article was more directly based on his doctoral dissertation. He summarized the major problems facing small firms when trying to develop technically advanced new products in the following way: (i) small firms have difficulties recruiting and retaining people with considerable education and unusual abilities, (ii) even when a small firm attracts high-quality engineers, they lack the benefits of "team research" and tend to be distracted by continuously having to solve everyday problems, (iii) even if small firms are able to develop a new product, they do not have the resources to exploit it, (iv) the risks of R&D in small firms are enormous – small firms can seldom afford to support more than a few R&D projects and almost always lack the resources to survive a "run of bad luck", and (v) even if a small firm is successful in developing and exploiting a new product, it is very likely to face heavy competition from larger companies. The conclusion that Cooper makes is that not every small manufacturing firm should be involved in the development of advanced new

products. Essential for such a strategy is the presence of at least one highly creative technical person in the firm, a company culture that emphasizes product development and a willingness to take risks.

### ***Technical Entrepreneurship***

In the 1960s, a large number of new technology-based firms emerged in different regions in the US, such as the areas around Boston, Palo Alto and Los Angeles. These firms seemed to be important in that they developed a significant number of technological innovations, creating new jobs as well as providing career opportunities for individuals who preferred the small-firm context. Thus, it was essential to gain a better understanding of how they emerged. The key questions raised were: What leads to the birth of these firms? In what way do incumbent firms in an area influence the birth of new technology-based firms?

In three seminal articles, Arnold Cooper elaborated on these questions (Cooper 1970, 1971, 1972). The research was based on a research project in the San Francisco area, around Palo Alto, and included three phases; (i) interviews with 30 entrepreneurs, (ii) telephone interviews with (or published data on) 250 new technology-based firms that had been created in the San Francisco area since 1960, and (iii) interviews with executives from established organizations. Some of the main results of the study can be summarized as follows:

#### *Characteristics of Spin-off Companies*

The decision to establish a new technology-based firm is influenced by three major factors:

1. The entrepreneur himself, his motivation, his perception, his skills and knowledge.
2. External factors, for example, the availability of capital, the accessibility of suppliers, and the collective attitude toward entrepreneurship.
3. The organizations ("incubator organization") in which the founder(s) had previously worked.

Cooper was mainly interested in the third factor – the incubator organizations. He found that the incubator organizations had a major influence on the location of new firms. New firms are closely related to the established organizations in a given region. For example, new firms are typically founded by entrepreneurs who are employed by organizations already located in the area, which means that if there are no such incubator organizations in a region, it is unlikely that any new technology-based firms will be established. Secondly, an entrepreneur typically starts his firm to exploit his own knowledge, and this knowledge is usually related to the market and technical knowledge developed at the incubation organization. This indicates that the new firm will serve the same general market or technology as the incubator organization. Finally, the incubator organization may influence the motivation of the entrepreneur to start a new firm – the entrepreneurs were especially motivated by events taking place within the incubator organization. In many cases the entrepreneurs felt frustrated in their previous position, due to "a lack of confidence in management", "a feeling that poor decisions were made", etc., indicating that a high spin-off rate is indicative of poor morale and frustration within the organization.

### *Incubator Organizations*

As we have seen, new technology-based firms are dependent upon local incubator organizations that hire, train and motivate potential entrepreneurs. This is reflected in the spin-off rates of different organizations. In the study, spin-off rates were calculated for 325 technology-based organizations in the Palo Alto area. The results indicated a wide variation in the rate of spin-offs from established firms. Most organizations (237 organizations) had no spin-offs. Among the few that had three or more spin-offs, the spin-off rate varied from 1 out of 3,100 employees to 1/14 (measured as the number of spin offs between 1 January 1960 to 1 July 1969, in relation to the average number of employees during the same period). The spin-off rate for the total group was 1/306. This indicates that even if the Palo Alto area in general could be regarded as a region favorable for entrepreneurship, organizations varied widely in the extent to which they functioned as incubators for new firms.

Why then do some organizations have higher spin-off rates than others? The characteristics of the incubator organization and the industry in which they operate may provide some explanations. In his literature review "Technical entrepreneurship: what do we know?" (Cooper 1973), he summarized some of the industrial and organizational attributes associated with the birth rate of new firms.

Arnold Cooper's research in the Palo Alto area (Cooper 1970, 1971, 1972) indicated that industries varied widely in the extent to which there were attractive opportunities that could be exploited by new firms. Fast growing industries and industries characterized by a high rate of technical change will offer many opportunities for new firms. On the other hand, industries with heavy capital investments or with competition from large organizations will have lower spin-off rates.

Spin-off rates also varied between small and large firms – the spin-off rate of smaller firms was about ten times that of large firms. The explanation could be that (i) large firms are often engaged in activities that require heavy capital investments, i.e., economies of scale are important, (ii) professional employees in small firms develop rather broad backgrounds, i.e., small firms constitute a valuable education for potential entrepreneurs, (iii) there is self-selection bias, i.e., those who choose to work in small firms may be more entrepreneurially inclined, and (iv) large firms probably employ a higher percentage of non-professional employees.

Finally, the results indicated that the spin-off rate for universities and non-profit research institutes is about the same as for large companies as a group, whereas the rate for government laboratories seems to be very low, which may be explained by the fact that the work done in these organizations does not have much commercial applicability and, in addition, the employees in general are more scientifically oriented and less entrepreneurial than their industrial counterparts.

### *Development and Performance Patterns*

The firms included in the study were analyzed in a longitudinal study for about a decade – Albert Bruno, a former student of Arnold Cooper's, went back to Silicon Valley and made follow-up studies in 1973, 1976 and 1980. The main objective was to identify development patterns of new technology-based firms and essentially to what extent these firms were closed down, acquired or attained abo-

ve average growth. The study was presented in Cooper and Bruno (1977) and in Bruno and Cooper (1982).

The results show that the discontinuance rate was very low. By 1976, the median firm was ten years old and, despite a nation-wide recession, the percentage of discontinued firms totaled only 29 percent, and by 1980 this figure stood at 37 percent. A comparison between the characteristics of "discontinued" and "high-growth" firms indicated that high-growth firms were more often started by multiple founders, the firms were more similar in terms of technology and/or markets to the organizations that the founders had left and, finally, the founders of high-tech firms were to a greater extent from larger organizations. Many large incubator organizations had experienced high growth, and the spin-offs from these firms were often positioned in the same high-growth markets.

An interesting finding was that the rate of acquisition or merger among the firms was high – which could also explain the low discontinuance rate, i.e., unsuccessful firms were acquired instead of being closed down. By 1976 as many as 21 percent of the firms were acquired or merged. The corresponding number for 1980 was about 32 percent. The peak acquisition period involves just the start-up period, and a second peak seems to occur 4 to 7 years after establishment. The attraction of acquiring a firm just after start-up could be the expertise of the founders and/or the product lines on which the firm was based. After 4 to 7 years the firms may have shown a growth rate that makes it necessary to replace the initial founders, who often came from an engineering background, by more professional managers.

### *An Extension of the Incubator Phenomenon*

Cooper carried out his research on incubator organizations in the 1960s and early 1970s, mainly focusing on high-technology firms. But there was no systematic examination of whether the influence of incubator organizations varies across industries and over time. In a broader, cross-sectional study, including 161 firms in different industries, Cooper (1984; 1985) found that most new firms did start geographically close to their incubator organizations, which reinforces the received view that entrepreneurship within a region is largely dependent on the existing pool of people. In general, new firms were also related to their incubator organization in terms of business. However, there were variations across industries. The linkages were most pronounced for electronics/computers, whereas the majority (54 percent) of non-technical firms were unrelated to the incubator organization – indicating that the necessary knowledge for these industries could be acquired through other channels.

Regarding the type of incubator organization, industrial firms were the incubator for 77 percent of the new firms, while software firms were more likely to be spin-offs from universities, and biotechnology/medical firms emanated mainly from universities or hospitals.

The conclusions seem to be that entrepreneurs in most industries do not move geographically and usually start firms related to what they did before and that prospective founders of non-technical firms appear to be less tied to the knowledge gained in an incubator organization. The implication for regional development is that the opportunity for high-technology start-ups may be very limited in many regions, and the role of universities seems to be less significant than is often assumed.

With the exception of software and biotechnology/medical firms, industrial firms have served as the main incubators.

### *Location and Technological Clusters*

The incubator organizations affect the location of new firms. At the same time, new technology-based firms often seem to start in clusters of related firms, which lead to concentrations of new technology-based firms. In a state-of-the-art chapter, Cooper and Folta (2000) discussed the questions “Why do new technology-based firms start where they do?” and “How does location make a difference?”

Clusters are not a purely high-technology phenomenon. For example, we can find clusters in the textile industry in Carolina and Georgia in the US, fashion goods in Milan, Italy, and diamond cutting in Belgium. Still, clustering appears to be particularly important for technology-based start-ups.

There seems to be strong empirical evidence that entrepreneurship, and not only high-technology entrepreneurship, is concentrated in particular regions and that new technology-based firms are found in certain regions or geographic clusters. What are the benefits and costs of locating in a cluster? Cooper and Folta presented a couple of factors that may influence the location decision of firms:

- Access to specialized labor, specialized inputs, and capital.
- Knowledge spillovers – knowledge spillovers occur more frequently if there are well-developed networks among people in different organizations and if there is substantial mobility in the workforce, i.e. geographic proximity may be vital for knowledge spillovers.
- Proximity to customers and support – location within a cluster could lead to lower search costs to find customers – and in many cases sales are made to other firms in the cluster.

Considering the above factors, it would appear that the benefits inherent in clusters should encourage entrepreneurs to locate in clusters. On the other hand, there is evidence suggesting that this is not the case – technical entrepreneurs tend to start their firms within commuting distance of their homes and previous places of employment. This indicates that they are relatively restricted in their decision about where to locate. However, in view of the importance of spillover effects, location in a cluster may be of special importance for firms trying to compete on differentiation strategies, for firms that make a high percentage of their sales to other firms in the cluster, and for firms in industries experiencing rapid change.

### *Entrepreneurial Diversity*

The entrepreneurial process is complex, and entrepreneurship involves many different kinds of people. However, most of the research on entrepreneurship during the 1970s studied main tendencies, and many studies used rather restricted samples of entrepreneurs. Of course, there is much to learn from general characteristics, but “average” tends to disregard the wide differences in the phenomenon – relatively little attention was devoted to entrepreneurial diversity, and there were few researchers who systematically used broadly based samples, including many industries, different time periods and geographic areas, etc. The study that Cooper conducted with William Dunkelberg is based on a random sample of members of the National Federation of Independent Business (NFIB). The questionnaire was mailed to 6,225 NFIB members in 1979, and 1,805

responses were received, i.e., a response rate of about 29 percent. The sample represented virtually all industries and all parts of the US. However, compared to the US business population as a whole, the sample seems to underrepresent very small firms and service sector firms. Nevertheless, the survey represents one of the largest and most diverse samples of small business owners studied at that time.

### *Typologies of Business Owners*

Business owners differ in a number of ways. Differences involve not only their background, but also their motivation and expectations for their firms. Typologies are extremely useful for our understanding of entrepreneurship because they capture frequently occurring combinations that are qualitatively different from each other, in addition to reducing the large number of potential profiles of entrepreneurs to a manageable few. Thus, while typologies may give a less detailed description of entrepreneurs – they provide a way of organizing diversity that makes it possible to identify patterns in a complex phenomenon. In addition, better predictions of entrepreneurial behavior and performance can be made, based on specific typologies.

A number of entrepreneur or small business owner typologies have been presented. Of these, Smith's (1967) “craftsman entrepreneurs” and “opportunistic entrepreneurs” classification may be the best known. The craftsman entrepreneurs came from blue-collar backgrounds and had relatively little education. As managers they were paternalistic, utilized personal relationships and followed a rather rigid business strategy. Opportunistic entrepreneurs had a middle class background, broader education and a previous association with top management. They were more proactive in marketing their firm and developed more innovative and diverse competitive strategies. In addition, Filley and Aldag (1978) classified business owners as craftsman, promotion and administrator types. Craftsman were less adaptive, inclined to avoid risk, concentrated on making a comfortable living, and their firms were stable. Promotion businesses were organized informally to exploit some type of unique competitive advantage, the firms were centrally controlled and often short-lived and transactional in nature. Finally, administrative businesses could be described as formalized and professional, larger in size and less dependent on the personal leadership of the business owner.

In their study, Dunkelberg and Cooper (1982) identified three types of business owners, who seemed to differ with respect to their background and prior experience:

- Growth-oriented owners, who were driven by a desire for substantial growth whose line of business was changing rapidly. They indicated a desire for growth over the following five-year period of more than 30 percent.
- Independence-oriented owners, who were strongly driven to avoid working for others. These business owners were more often found in agriculture and professional practice (such as dentists, engineers, and accountants). Compared to the other groups of business owners, they more often purchased their firms.
- Craftsman-oriented owners, who were strongly drawn toward doing a particular type of job. They tended to have the least formal education and were more likely to have started their firm themselves.

Compared to previous typologies (e.g., Smith 1967, and Filley and Aldag 1978), only the independence-oriented owners seem to be

distinct from earlier studies. It is interesting to note that 74 percent of the 1,805 owners were classified into one of the three groups and that none of the three groups were concentrated in any one industry, indicating that these types of business owners could be found in all kinds of business activity.

### *Critics of Typologies*

As already noted, one of the most well-known typologies is the distinction between “craftsman entrepreneurs” and “opportunistic entrepreneurs” developed by Smith (1967). The support for these two types of entrepreneurs has been strong and consistent in several studies (see, e.g., Filley and Aldag 1978, and Dunkelberg and Cooper 1982). However, there may be inconsistencies behind these results, based on differences and limitations in research designs and the samples used in different studies and also due to the dimensions used to make the categorization. A closer examination of previous studies showed that craftsman and opportunistic entrepreneurs were identified on the basis of two criteria in one study, whereas in another study, no less than 50 criteria were employed. Based on this uncertainty, Arnold Cooper together with Carolyn Woo and William Dunkelberg (Woo, Cooper and Dunkelberg 1988, 1991) posed the question “How sensitive is the derivation of generic entrepreneurial types to the choice of classification criteria?”, or put in another way “How likely are we to obtain the same grouping of entrepreneurs from different classification schemes?” If the grouping of entrepreneurs is robust and not sensitive to the choice of dimensions, then prior studies are consistent, and we can find knowledge accumulation within the field.

Cooper and his collaborators tested the consistency of the craftsman-opportunistic typologies on a large sample of manufacturing and retail start-ups, using different dimensions of entrepreneurial classification such as: (i) goals, (ii) goals and entrepreneurial background, and (iii) goals, entrepreneurial background and management style. The results showed that different dimensions produced different groupings. When using only “goals” as an entrepreneurial dimension, no clear-cut difference between craftsman and opportunistic types could be identified. Instead, two other groups of entrepreneurs emerged, which could be described as “independent entrepreneurs” versus “organization builders”. When the background dimension was added to the analyses, the entrepreneurs were reclassified into two new groups – “craftsman entrepreneurs” versus “administrative entrepreneurs”. A similar categorization was found when the management style dimension was included. Furthermore, individual entrepreneurs often shifted group membership as classification dimensions were added.

It was thus concluded that the derivation of entrepreneurial types is not robust with respect to the choice of entrepreneurial dimensions used. This makes the likelihood of obtaining similar entrepreneurial types across studies using different dimensions extremely unlikely and the convergence of earlier studies questionable. It may be that the craftsman or opportunistic types of entrepreneurs only show partial correspondence between different studies. This indicates that the impact of entrepreneurial types cannot be generalized across studies and that the conceptual and theoretical extension of the research can be questioned. Thus, caution must be exercised when interpreting findings on entrepreneurial types, a close inspection must be made of the process, by which the entrepreneurial types were constructed, and there is a need for consistency and careful

consideration of the definition of types before validated entrepreneurial descriptions can be developed.

### *The Entrepreneurial Process and Performance*

Knowledge of predictors of new firm performance is unquestionably of interest to entrepreneurs, to those who provide advice to entrepreneurs as well as to investors in new ventures. But why do some new firms succeed whereas others fail? In 1985, Arnold Cooper, William Dunkelberg, William Dennis, and later Carolyn Woo started a large-scale, longitudinal study of entrepreneurs and their firms. The study was jointly initiated with the National Federation of Independent Business (NFIB). The focus of the research program was to examine the start-up process of new firms and the determinants of performance in these firms. The variables included in the framework are the characteristics of entrepreneurs, the founding process, initial firm characteristics, environmental characteristics and performance.

The research program consisted of a three-year longitudinal study of new businesses. The sample represented all geographic areas and all sectors of the US economy. Compared to the US economy, retail businesses and businesses in the western part of the US seemed to be somewhat overrepresented in the sample but in broad terms the sample appeared to be representative of new businesses in the US. The respondents in the first survey were mailed follow-up questionnaires, and the non-respondents were followed up carefully, which enabled Cooper to determine the survival or failure status of almost all 2,994 businesses in the first survey. Findings from the research program have been reported at a number of conferences and in scientific journals throughout the 1980s and 1990s. In general, the research program is very well designed, both conceptually and methodologically. Some of the main findings from the program will be summarized below.

### *The Entrepreneurial Process*

Entrepreneurs involved in starting firms must engage in a process of assessing the prerequisites for success. In this respect the following questions may be of interest: How do entrepreneurs perceive their chances of success? Do they see themselves as undertaking risky ventures with marginal prospects, or are they confident that they will succeed? In cases of over-optimism there is a possibility that entrepreneurs may underestimate the difficulties associated with the start-up and fail to make the necessary preparations. On the other hand, pessimistic entrepreneurs may focus on the short-term problems and have less inclination to continue when start-up difficulties arise. Cooper, Woo and Dunkelberg (1988) found that entrepreneurs who have made the decision to become business owners show a remarkable degree of optimism. They see their own odds for success as extremely high (81 percent perceived the odds of 7 out of 10 or better, of which 33 percent regarded their chances as “certain” or 10 out of 10). This extreme tendency toward optimism may be explained by a “cognitive dissonance”, which leads the entrepreneur to exaggerate the attractiveness of an option after it has been chosen, although a psychological trait involving a propensity to take risks and strong internal locus-of-control beliefs may also play a role. The study also showed that those entrepreneurs who were well prepared and those who were poorly prepared seemed equally optimistic. This may indicate that entrepreneurs are unable to assess their own

strengths and weaknesses and the early progress of their firms, but also that all entrepreneurs, whether prepared or not, experience “entrepreneurial euphoria” in which they feel that success is certain.

Information is a key resource for new ventures and a critical factor for the entrepreneur. It may be that entrepreneurs expressing a high degree of confidence in the chances of success of their new firms will seek less information, but it could also be hypothesized that entrepreneurs with previous entrepreneurial experience and entrepreneurs operating in familiar domains will seek more information because of their richer “schema” and greater awareness of what is required. Cooper, Folta and Woo (1995; see also Woo, Folta and Cooper 1992) supported the relationship between confidence and the search for information and between those entrepreneurs operating within familiar fields and the search for information. But entrepreneurs with no prior entrepreneurial experience sought more, not less, information, and this was especially significant when they entered a field they knew – in such situations the novice entrepreneurs engaged in a more intensive search. Experienced entrepreneurs, on the other hand, seemed to search with about the same intensity, regardless of whether they were familiar with the field or not. One explanation may be that experienced entrepreneurs had developed a richer “schema” but were also more confident and that they may have developed more fixed routines – having become prisoners of their past success. In Cooper, Folta and Woo (1991), it was also found that entrepreneurs utilized personal and professional sources of information to a greater extent than public sources of information, which can be explained by the fact that entrepreneurs perform better in richly connected, flexible and accessible networks.

### *Entrepreneurial Satisfaction*

How satisfied then are the entrepreneurs with their businesses after three years of business ownership? Entrepreneurial satisfaction could in this respect be regarded as a basic measure of performance. In Cooper and Artz (1993, 1995), the authors suggest that individual satisfaction is determined, in part, by whether there is a “gap” between actual rewards (or performance) and the individual goals (or expectations). It was hypothesized that (i) entrepreneurs emphasizing primarily non-economic goals (such as doing the work they wanted to do) would show a higher degree of satisfaction when the business performance was poor, whereas (ii) the satisfaction of those emphasizing economic goals would vary in relation to economic performance. In addition, it was hypothesized that when controlling for performance, entrepreneurs with higher initial expectations would have a lower level of satisfaction because of the greater expectation-performance gap.

The study shows that among firms experiencing marginal performance, those entrepreneurs emphasizing non-economic goals expressed higher levels of satisfaction. Interestingly, and contrary to expectations, those who were initially optimistic were more satisfied later on, even when controlling for performance, and those who had a positive view of the initial process later viewed the experience of business ownership more favorably. The explanation may lie in the benchmark that entrepreneurs use to measure their performance, i.e., as their experience increases, their expectations also evolve to different degrees after three years of operation.

McCarthy, Schoorman and Cooper (1993) also showed that the

entrepreneur who starts a business and expresses overconfidence about its chances for success will exhibit an escalation bias in future decisions regarding the expansion of the business. That is, when entrepreneurs express overconfidence, it may be a strong indication that a significant psychological commitment has been made and that the entrepreneur may take the risk of escalation bias in subsequent decisions. Thus, the entrepreneur's initial expectations are associated with subsequent satisfaction and may thus influence whether or not the entrepreneur decides to invest more time and money or to exit their businesses.

### *The Performance of Different Categories of New Firms*

Several studies prior to those of Arnold Cooper and his colleagues have examined the discontinuance rate of new firms. The research presented in Cooper, Dunkelberg and Woo (1988) showed that the discontinuance rate among new firms was lower than expected – only 11 percent of the firms went out of business during the first year, and an additional 8 percent during the second year. There were also systematic differences in the characteristics of surviving firms compared to those that failed. Among other things, entrepreneurs associated with surviving firms tended to be older, more educated, have industry experience (although managerial experience was not associated with greater chances of survival), and their firms were closely related to their previous work as well as larger in size, compared to those entrepreneurs who failed.

Thus, the initial size of the new firms seems to be associated with performance, although the characteristics of the entrepreneurs and the process of starting the firm also seem to differ. Initial size is related to the financial and human resources that must be assembled and to the ability of the firm to survive and grow. In Cooper, Woo and Dunkelberg (1989) it was shown that entrepreneurs starting larger firms had the requisite background to muster substantial resources – better education, greater management experience, and goals that were more managerial in nature. They tended to rely more upon external investors and utilized professional advisors to a greater extent than those starting smaller ventures, and the venture was more closely linked to their previous jobs.

There were minor differences in performance between larger and smaller ventures. The smaller ventures showed somewhat higher discontinuance rates (14 percent versus 7 percent of the initial sample after the second year of operation). Both groups of surviving firms reported a low level of serious problems as well as few changes in the direction of the firms, except that smaller ventures were likely to lose partners and larger ventures more likely to add branches or locations. Finally, both groups reported high mean growth rates, although they both included firms that grew substantially whereas others scaled down – indicating the fluidity and experimental character of new firms. The conclusion seems to be that there is no optimal initial size – such decisions must be based upon the particular circumstances confronting each individual entrepreneur.

The study indicated that women start smaller ventures than men. This issue was further elaborated on in Srinivasan, Woo and Cooper (1994). The results provided clear evidence that female-owned ventures were less successful, both in terms of survival and growth, in comparison to male-owned businesses. Looking at the determinants of survival, female-owned businesses were more likely to survive if they were similar to the incubator organization

that the entrepreneur left and, somewhat surprisingly, less likely to survive if the entrepreneur emphasized the goal of building a successful organization. It may be that those who aspired to growth and experienced only marginal performance could have concluded that they were not achieving the required “threshold level of performance” that would justify the continued existence of the firm. The determinants for growth seem to be influenced by other factors – indicating that survival and growth are two distinct processes. Female-owned ventures were more likely to grow if the entrepreneur emphasized the goal of doing the work they wanted to do, if they quit their previous employment with definite plans for the new venture, and if their ventures were similar to the organizations where they used to work.

### *Human and Financial Capital as Predictors of Performance*

The initial resources at the time of start-up may be of significant importance as a predictor of performance. Cooper, Gimeno-Gascon and Woo (1994) examined the extent to which the initial human and financial resources can be used to predict the probabilities of different performance outcomes, such as failure, marginal survival and high growth. Four categories of human and financial capital were considered in the study: (i) general human capital (education, gender and race), (ii) management know-how, embodied in the entrepreneur or available through advisors or partners, (iii) specific industry know-how, i.e., previous experience of the same or a similar business, and (iv) initial financial capital raised in the firm.

The results indicate that it should be possible to predict the performance of new firms with some degree of confidence. Interestingly, “survival” and “growth” seem to be governed by similar processes – only a few variables show a strongly different impact. For example, several measures of general human capital influenced both survival and growth. The exception was gender – female-owned ventures were less likely to grow, but just as likely to survive. Similarly, industry-specific know-how and financial capital contributed to both survival and growth.

In a further analysis Cooper and his colleagues argue that new venture survival is not strictly a function of economic performance but also dependent on a firm's own “threshold of performance”, determined by the entrepreneur's human capital characteristics, such as alternative employment opportunities, psychic income from entrepreneurship, and cost of switching to other occupations, i.e., new firm survival is influenced by both the determinants of performance and thresholds (Gimeno, Folta, Cooper and Woo 1997).

In prior studies it has frequently been argued that, in the long run, well-performing firms survive while poorly performing ones disappear as a consequence of a natural selection – the firms that make profits are selected or “adapted” by the environment, while others are rejected and disappear. This argument is based on a relationship between performance and survival – the worst performing firms are also the least likely to survive. In contrast, Cooper et al. argue that firms differ in their thresholds of performance, and exit or survival is determined by whether economic performance falls below or remains above that firm-specific threshold. In turn, this is dependent on the entrepreneur – the willingness to withstand poor performance is partly determined by the mobility of the resources controlled by the entrepreneur. This argumentation is developed in

a “threshold model of entrepreneurial exit”.

The empirical analysis provides strong support for the threshold model. Survival of the venture will be influenced by the switching costs for the entrepreneur (i.e., the costs of switching to a new employment) and by the psychic income from entrepreneurship (i.e., the personal satisfaction the entrepreneur derives from self-employment). Previous research has shown that entry into entrepreneurship may be more likely for those with reduced options elsewhere, and this study shows that those entrepreneurs are also more likely to survive, independent of performance. In order to understand the entrepreneurial process, it is of importance to include the threshold of the entrepreneur. The contribution of the study is that it helps us explain the inconsistencies in earlier studies. Furthermore, the threshold of performance concept develops our knowledge about the determinants influencing performance and survival of new firms.

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