

THE IMPACT OF ORGANIZATIONAL IDENTITY ON LEARNING FROM INITIAL EXPERIENCES

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ABSTRACT

In this dissertation I develop new theory which suggests that a complete understanding of how or if an organization learns from its experiences must take into account its identity. Specifically, identity serves as the lens through which organizations notice, interpret and respond to experiences. Adopting this perspective, I develop and test theory that suggests that different identities at founding can account for why organizations learn differently from similar experiences and how this learning affects time to commercialization of their product or service. I investigate my research questions using data from a sample of start-up organizations located around a large research university.

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EXECUTIVE SUMMARY

Overview

Securing resources is critical for new firms. The government plays a role in this process by providing funds for small firms. One such program is the Small Business Administration's Small Business Innovation Research (SBIR) program. The program, established in 1982, is designed to promote innovation and commercialization among small firms by providing early stage grant funding. Despite the popularity of the program, there is also a concern that the program has led to the proliferation of SBIR "mills", which are firms that are good at winning grants but not good at achieving the program's ultimate objectives. In this dissertation, I question why winning grants helps certain firms reach commercial outcomes while it hinders others.

To answer this question, I draw on theoretical insights from two research streams – organizational learning and organizational identity. Organizations learn when their experience systematically changes their future behaviors. In many cases, the accumulation of experience results in favorable outcomes, such as lower operating costs or more innovations. Unlike at the individual level, in which learning is generally seen as something positive, not all learning is beneficial at the organizational level. When an organization's experience compels it to stick with a particular practice or strategy despite the existence of a superior alternative, it is said to have fallen into a competency trap.

One factor which may play prominently as to whether experience results in generally favorable or unfavorable outcomes is how the organization responds to its very first or initial experiences. Because many organizations do not survive beyond the first few years after founding, these initial experiences are critical. Despite this obvious importance of focusing on

early experiences, this has received very little attention in the literature. My dissertation addresses this gap by examining organizations' initial experiences within the SBIR program.

Through eleven participating federal agencies, small firms compete for SBIR grants and contracts in a multi-phased program. Phase I is a feasibility stage, with awards up to \$100,000. The purpose of Phase I is to demonstrate that the proposing firm can do quality research and that the technology is technically feasible. The focus in this phase is on prototyping or developing proof of concept. Phase I winners can subsequently apply for Phase II awards, which can be up to \$750,000. The focus in Phase II is on R&D work and commercialization potential. Importantly, there is no set pathway through the SBIR program. Organizations can win multiple Phase I and Phase II awards and can follow a Phase II award with another Phase I award. Organizations can apply for (and win) multiple awards, although agencies try not to fund essentially equivalent work. Competition for these awards is strong. In 2008, the National Institutes of Health (which is part of the Department of Health and Human Services) granted awards to 27% of its Phase I applicants and 48% of its Phase II applicants. Total annual funding under the entire SBIR program is now around \$2 billion.

Investigations of the so-called mill effect have generated conflicting findings. In 2008, the National Resource Council of the National Academies (NRC) completed a comprehensive assessment of the SBIR program. This report found that although a large number of awards are concentrated within a relatively small number of firms, these same firms account for a commensurately high proportion of commercial outcomes. This tends to refute the notion of mills. Some academic research, however, has found that winning an initial SBIR award leads to positive outcomes but that these same benefits dissipate for multiple award winners. In my

dissertation, I tackle this issue specifically by suggesting that the occurrence of the mill effect may depend on the firm's identity when it was founded.

In looking at firms' identities, I specifically focus on how business oriented or science oriented the organizations were at founding. A business oriented firm is one that was founded around values and practices associated with the institution of commerce. A science oriented firm is one that was founded around values and practices associated with the institution of science. Following on the sociological work of Merton, many scholars have noted that participants in commerce and science march to the beat of very different drums. Broadly speaking, commerce is concerned with producing profit while science is concerned with producing knowledge.

Following another sociological tradition, I suggest that these particular identity orientations can be imprinted at founding. Imprinting occurs because organizations are created out of the specific technologic, economic, political, and cultural resources available at the time of founding. In other words, founders rely on existing social structures and practices and have access only to available knowledge and resources when making early decisions in their organization's life history. Repercussions of these early decisions are then felt by the organization later in its life. Research has demonstrated that decisions pertaining to strategic focus, employment models, and functional structures imprint organizations in meaningful ways. I theorize that the early identity orientation that an organization adopts will also affect it in a meaningful way.

Specifically, I argue that an organization's identity affects how it notices, interprets and responds to its experiences. In this work, I am most interested in the response component of this identity-based learning framework. In particular, I argue that an organization's identity affects how it allocates resources in response to experiences. While my theory is broad and

generalizeable, for purposes of empirical testing I focus on the number of SBIR awards a firm wins in its first year of winning any awards as my “experience” variable.

To capture the firms’ underlying identity orientations, I used a survey instrument that asked respondents to indicate the key factors behind the founding of their firm. In constructing this survey question, I relied on prior research which has identified various reasons that people start firms, and specifically the motivating factors that drive scientists to start firms. Before distributing these surveys, I classified certain responses as being science oriented and others as being business oriented. An example of the former is “shaping the direction of science” whereas an example of the latter is “firm wealth creation”. Respondents then evaluated these factors on how important each was in establishing their firm. For purposes of my analysis, I classified firms as being pure science if their score was above the median on the science oriented scale and below the median on the business oriented scale. Pure business firms scored above the median on the business oriented scale and below the median on the science oriented scale.

I tested my research questions on a sample of 151 organizations located near a large research university. The sample consisted of a wide range of organizations, with the most commonly represented industries being biotechnology (24%), other manufacturing (19%), professional, scientific and technical services (15%) and other information – not telecommunications or data processing (13%). Almost a third of the firms formally licensed their technology from a technology transfer office. Firms in the sample tended to be rather small at founding, averaging 2.4 founders and 2.1 full-time equivalents at the date of establishment. Around 80% of the firms in the sample generated sales at some point, with the median time to sales being 2 years after they were established. Of the firms in the sample, 55 firms applied for SBIR awards before generating any sales and of those, 32 won at least one Phase I award.

Findings

I addressed my main research question by using an event history (also known as survival analysis) specification in which the dependent variable was the time to commercialization. My primary hypotheses were that winning more initial SBIR awards would lead to faster commercialization for business oriented firms while it would lead to slower commercialization times for science oriented firms. I failed to find statistical support for this first hypothesis. So on average, winning more initial awards neither helps nor hurts business oriented firms in their commercialization efforts. It may be that this set of business oriented firms is quite diverse, with some firms using more awards to purposely search for longer term (and potentially more highly valued) opportunities, while others leverage the multiple awards to lead to shorter times to commercialization. Further research is needed to address this interesting puzzle.

I did find that winning more initial SBIR awards leads to longer times to commercialization for the science oriented firms. Thus, relative to non-science oriented firms, winning an additional initial SBIR awards lengthens the time to commercialization by 37 percent. My theory suggests that the underlying process behind this finding is that by winning multiple awards initially, these firms learn that they can actually behave more like a lab than like a commercially oriented firm. This finding has interesting implications for the SBIR program. One of the criticisms of the program has been that SBIR merely cherry picks projects. In other words, SBIR winners are firms that likely would have been successful without the award. In general, this pattern does not show up in my data. If cherry picking were taking place, we might expect that SBIR winning firms would experience faster times to commercialization (even though the faster times were not attributable to winning the award per se), but as I have just described, this isn't the pattern I found.

This finding also raises interesting questions about the so-called SBIR mill effect. One way to potentially mitigate the risk of SBIR mills is for the SBA to make a more concerted effort to monitor the activities and decisions of the various granting agencies, at least for firms' initial awards. Findings also suggest a potential new screening criterion. Proposal evaluations, especially at the Phase I level, are primarily focused on the technical capabilities of the principle investigator and the project team. My findings suggest that granting agencies may also want to consider paying attention to underlying identities. However, I caution that this is only in regards to the timing of generating revenues. There are other outcomes of interest to SBIR and the granting agencies such that even if winning awards leads to longer time to commercialization, the overall objectives of the grantors may still be achieved. This remains an important policy question and one well-suited for future research.

My dissertation generated some interesting non-SBIR findings as well. Although I do not hypothesize about the effects of the identity variables, it is interesting to examine those results. Across the models, I do not find support that being a science oriented firm has any unconditional effect on the time to commercialization. However, there is some evidence that being a business oriented firm leads to a faster time to commercialization. On average, I found that firms' likelihood of generating sales increases as they age until they are about two years old, after which time the likelihood decreases. I found that biotechnology firms on average had longer times to commercialization, as did firms established more recently. I also found that firms that formally licensed a technology from a technology transfer office had systematically longer times to commercialization. Although this finding is consistent with firms that license technologies choosing to pursue more distant opportunities, it could also reflect something about the licensing process itself that delays commercialization.

My dissertation makes three major contributions. First, it contributes to theories of organizational learning by developing and testing a dynamic model of learning from experience that is conditional on an organization's identity. This is the first work that I am aware of that specifically addresses how organizations learn differently depending on their underlying identities. This research has special relevance for the study of new organizations and organizations that attempt to learn from few or rare experiences, but also has implications for established organizations as well. In particular, my model calls into question some of the empirical findings existing in the literature that uncover a curvilinear effect of experience on learning outcomes (in which some experience is beneficial but too much experience is detrimental). My results suggest that what is sometimes seen as a curvilinear effect may actually be the result of differences in underlying identities. My identity-based framework also provides a richer and more complete account of why some organizations ignore events and others heed them by establishing identity as the particular lens through which an organization notices, interprets and responds to events. Therefore, incorporating identity into theories of learning provides a richer and potentially more accurate explication of the actual causal mechanisms that occur in organizations.

Second, this study enriches organizational identity literature in both theory and measurement development. At the theoretical level, my study contributes to emerging theory about the role that certain identity orientations can have on important organizational outcomes. Importantly, my research explores both the facilitating and inhibiting role that identity can have on the development of capabilities. In addition, by focusing specifically on business oriented and science oriented identities, my dissertation contributes to ongoing debates about the intersection of commerce and science.

Third, by situating my dissertation in the study of new firms, my findings have relevance for studies of entrepreneurship and the development of early capabilities. I focus on an important outcome in the life history of organizations – when or if they ever generate revenues. Overall, my findings suggest there are many alternative pathways to commercialization, and therefore my results echo some of the previous research which has found this to be a difficult outcome to predict. However, certain findings in this dissertation are robust and offer insights into the process of commercialization for new firms.