Available online at www.sciencedirect.com
SCIENCE DIRECT®
Research Policy 34 (2005) 703–716
research policy
www.elsevier.com/locate/econbase

Highly innovative small firms in the markets for technology

Diana Hicks *, Deepak Hegde

School of Public Policy, Georgia Institute of Technology, 685 Cherry Street, Atlanta, GA 30332, USA

Received 22 July 2004; received in revised form 7 March 2005; accepted 9 March 2005
Available online 31 May 2005

Abstract

Long-lived small firms with a substantial, public record of innovative success are the focus of this paper. We label such firms "serial innovators" and argue that they are often specialist suppliers in markets for technology. To survive as specialist suppliers, firms must produce technology that is broadly tradable. Using Arora, Fosfuri and Gambardella's markets-for-technology framework, we hypothesize that such technology has certain characteristics. It is: high quality, general purpose, broadly based, quite basic, and concentrated in newer generations of technology. We find that serial innovators, survivors among the specialist technology suppliers, have mastered innovating in technology with these characteristics. This helps explain why these firms have become serious players in these markets—at least for a few years until a new generation of technology emerges.
© 2005 Elsevier B.V. All rights reserved.

Keywords: Small-firms; Innovation; Patents

1. Introduction

Small firms have long engaged the interest of students of innovation. The innovative efforts of small firms embody a tension between serious barriers and distinct advantages relative to large firms.[1] Establishing empirically the balance between these forces involved investigating whether small firms innovated more or less efficiently than large firms.[2] From the policy viewpoint, new technology-based firms have been studied for their promise of growth and new jobs. Such studies have assumed that small firms were mini-large firms: Were mini-large firms more or less efficient innovators than large firms? Which mini-large firms would grow large?

Large size has been seen as the natural outcome of small firm survival and success. In this paper we establish the empirical reality of long-lived, highly innova-

* Corresponding author. Tel.: +1 404 385 6015; fax: +1 404 385 0504.
E-mail addresses: diana.hicks@pubpolicy.gatech.edu (D. Hicks), deepak.hegde@pubpolicy.gatech.edu (D. Hegde).

[1] See, for example, Cohen and Klepper (1991), Feldman (1997), Freeman and Soete (1997), Koen (1992), Obermayer (1981), Romeo (1984), Rothwell and Zegveld (1982) and Rubenstein and Ettlie (1983).

[2] See: Edwards and Gordon (1984), Gellman Research Associates (1982), Pavitt et al. (1987), Acs and Audretsch (1987) and Cohen and Klepper (1996). Kamien and Schwartz (1975) provides an excellent (if dated) review of key studies concerning innovation and firm size.

0048-7333/$ – see front matter © 2005 Elsevier B.V. All rights reserved.
doi:10.1016/j.respol.2005.03.008

tive small firms. We find innovative firms that have survived beyond the entrepreneurial moment yet remain small. Such firms are so unlike the giant multi-national that their relative innovative efficiency seems irrelevant. We argue that these firms, which we name "serial innovators", are often successful specialized suppliers of technology.

Serial innovators are part of an innovative division of labor. Several scholars, most prominently Stigler (1951), and more recently Von Hippel (1994, 1998) and Helpman (1998), have argued that the increasing division of labor in innovation must be understood in order to understand the sources of organizational change and economic growth in the 21st century. Today we see markets for technology developing, encouraging the innovative division of labor, and the existence of small high-technology firms. Arora, Fosfuri and Gambardella analyze in detail markets for intermediate technological inputs, that is markets in which transactions create new technology. They include within their remit contract research, technology licensing, R&D joint ventures of various kinds, sale or licensing of research tools and other types of technical services (Arora et al., 2001, p. 6). When such markets reflect a division of innovative labor involving specialist suppliers of technology, we are likely to find small firms.

Success in technology markets does not come easily; relatively few small firms survive. We examine here the survivors, and take advantage of that fact to explore the characteristics of technology likely to be more tradable by comparing serial innovator technology with that of large firms innovating largely for in-house use. We hypothesize that compared to in-house technology, tradable technology will be: higher quality, more general purpose, more broadly based, more basic, and more concentrated in newer generations of technology. Our results have implications not only for the technology strategy of small firms, but also for others entering technology markets, such as universities or public sector research laboratories.

2. What is a serial innovator?

We label as "serial innovators" small firms with a sustained, public record of successful technical advance. Using a standard definition, "small" firms are those with 500 or fewer employees. We use patent information as a public record of sustained technical advance. We examine here the set of U.S. firms with 15 or more USPTO patents issued between 1996 and 2000. To be included an organization had to be independent, for-profit, not bankrupt, not a joint venture and not foreign owned during the first half of 2002 when the data were collected. All establishments and subsidiaries were unified to the ultimate parent company; their patents counted towards the parent firm patent count. The population of US firms with more than 15 patents issued over the period 1996–2000 encompasses 1071 firms. One-third of these or 356 are small firms and 27 are of unknown size.[3] The firms own 193,976 patents (here as in what follows "patents" refers to type 1, utility patents that list a U.S. inventor address and were issued by the USPTO between 1996 and 2000) and small firms account for 6% of these patents.[4] Hence, of the firms with 15 or more patents, 33% are small firms, which own 6% of the patents.

For a small firm, owning 15 patents is quite an achievement. Therefore, we are not looking at start-up firms, the promising beginnings that grab most media attention. Our small firms are survivors and have attained a track record of credible technical achievement over at least 5 years. A good description of such firms was devised by Leigh Buchanan, a journalist with Inc. magazine, who labeled them "serial innovators."[5] She contrasts serial innovators with serial entrepreneurs. Small firms normally start with a great idea. The firm is founded to exploit the idea, to get it out into the marketplace. If it fails the firm disappears; if it works the entrepreneur may sell out. Even if the idea works and the firm is not sold, the next idea, or a process to generate more ideas becomes a problem, and often the small firm disappears after the first idea is worked through. Whatever the outcome, in the U.S. the entrepreneur is likely to go on to start another firm, and there are many "serial entrepreneurs." Serial innovators are firms distinguished by their success in sustaining innovation

[3] The patenting characteristics of the firms of unknown size suggest they are small, and we include them amongst the small firms.

[4] Small firms account for a large share of patents produced by organizations with less than 15 patents 1996–2000. We estimate that overall small firms account for about 43% of U.S. company-owned patents. This is quite close to their share of employment. See Hicks (2002).

[5] The August 2002 issue of Inc. magazine contains profiles of some of these firms.

Download English Version:

https://daneshyari.com/en/article/10483280

Download Persian Version:

https://daneshyari.com/article/10483280

Daneshyari.com