Research Policy 41 (2012) 734–742

Contents lists available at SciVerse ScienceDirect

Research Policy

journal homepage: www.elsevier.com/locate/respol

Creative destruction: Identifying its geographic origins

Brett Anitra Gilbert*

Rutgers Business School, Rutgers University, 1 Washington Park, Rm 1032, Newark, NJ 07102, United States

ARTICLE INFO

Article history:
Received 2 September 2010
Received in revised form
26 November 2011
Accepted 26 November 2011
Available online 20 December 2011

Keywords:
Creative destruction
Technological discontinuities
Geographic clusters
Political economy

ABSTRACT

The fate of regions and industries are often intertwined. When industries thrive, regions and their constituents benefit. However, when industries decline, regions often require new paradigms to replace the old paradigms, and infuse new economic life into the region. This study enhances understanding of the regional characteristics that hinder or promote creative destruction. It enlightens the field on the geographic origins of creative destruction by theorizing about a region's structural (determined by industry clustering and regional knowledge), social demography and political economy attributes, and their influence on the region's capacity to incubate creative destruction.

1. Introduction

A nation's competitiveness is tied to the strength of its firms, industries, cities and regions (Porter, 1998, 2003). When firms and industries thrive they make significant contributions to the economic wealth within the cities and regions where they are located. Conversely, when firms and industries suffer, they often initiate adverse conditions to a region and its constituents. In fact, one would need look no further than the metro Detroit area, which experienced a dramatic downturn in the quality of life after the automotive industry to which it has been tied since industry beginnings (Klepper, 2002), endured a period of decline in the late 2000s. Industry problems create city and regional problems, which can trigger a need for the "creative destruction" of old industrial paradigms to revitalize industries and the regions where they operate.

Creative destruction applies resources, knowledge and skills to existing or future problems in new ways. The process expands entrepreneurial opportunity by creating new forms of demand and supporting resources. For example, the introduction of the iPhone opened doors for application providers to offer products that meet the needs of iPhone customers. Android phones have similarly created new forms of supply and demand in the marketplace. Thus, creative destruction facilitates a transition from old, inefficient systems to new paradigms (Schumpeter, 1934), which Dosi (1988) defines as the needs a technology addresses and the materials it uses to satisfy the need. While the marketplace often benefits from the changes creative destruction brings, the process is sometimes slowed by the predominance of incumbent technologies within industries and regions, which "lock-in" a given technological paradigm and restrict the flow of new ideas into the areas where they exist (Grabher, 1993). Scholars have long acknowledged the unlikelihood of creative destruction emerging from regions where an industry has clustered (Storper and Walker, 1989). In fact, cluster firms are generally described as being 'caught off-guard' when new paradigms emerged in the marketplace (Pouder and St. John, 1996; Sull, 2001). Yet despite general acknowledgement that paradigm-changing technologies tend to emerge from outside of industry cluster regions, we know very little about the geographic regions from which we can expect creative destruction to emerge.

The objective of this research is to present a theoretical framework that enhances understanding of the geographic characteristics that promote or discourage creative destruction. In this study, creative destruction is conceptualized in terms of technological discontinuities, which are technological changes that incorporate new knowledge, resources or skills that destroy the value of incumbent systems and technologies in the marketplace (Anderson and Tushman, 1990; Daneels, 2004). The framework integrates the literature on geographic clusters, disruptive and discontinuous technologies, and technological and social change to isolate the geographic factors that influence creative destruction. It acknowledges that creative destruction occurs differently in regions depending on the structure of industry activity, the social demography and political economy. It is among the first studies that integrates disparate streams of research to propose a framework that enlightens understanding of where creative destruction may emerge. Therefore, this study makes several important contributions to the field. First, the framework helps entrepreneurs to

* Tel.: +1 973 353 1621; fax: +1 973 353 1650.
E-mail address: bagilbert@business.rutgers.edu

0048-7333/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.respol.2011.11.005

understand the extent to which a region will have the capacity to incubate creative destruction. It also aids regional policy officials in their efforts to exercise strategic management over industrial activities in their regions. Second, as many cities have initiated activities to begin a transition to new socio-technical paradigms (Hodson and Marvin, 2010), this research is well-timed to provide insights that aid those who are fostering the transitions. Last, to scholars of economic geography, entrepreneurship and strategic management, this framework adds new perspectives with respect to how to conceptualize and examine regions and their potential for creative destruction.

2. Forms of creative destruction

Creative destruction emerges in different ways and affects a firm's operations at different levels. Competence-enhancing creative destruction generates technologies that build on the knowledge and competencies that incumbents already have and combines the current and emergent knowledge to improve the performance of existing technologies and systems (Anderson and Tushman, 1990). Historically, competence-enhancing technologies have been introduced by incumbents who were either already competing in the industry (Rothaermel and Hill, 2005; Tripsas, 1997), or capable of leveraging their existing competencies when entering a new market (Mitchell, 1989). For example, Glasmeier (1991) describes three discontinuities that occurred in the Swiss watch industry. The innovations changed the internal operation of watches from mechanical – to electric – and then to quartz. In some cases, incumbents had difficulties adjusting to the new technologies. However, with each discontinuity except one, only the internal operation of the watch changed. Its functionality to customers was largely the same. While each discontinuity shifted the locus of power within the global industry to different nations, it was the incumbents in the nations who were often responsible for leading the technological change.[1]

Incumbent firms pursue competence-enhancing technologies because they invest considerable amounts of time, financial and research resources into strengthening their competencies in the incumbent technologies. Moreover, their ties to customers, suppliers and complementary product providers who are invested in the dominant design, motivates the focus of R&D activities toward identifying the next generation technologies for existing products (Christensen, 2003; Tripsas, 1997). This focus directs their attention toward solving the problems suppressing the performance of existing technologies, rather than searching for alternative solutions to the technologies (Cyert and March, 1963; Grant, 1996; Jenkins and Floyd, 2001). Ultimately, competence-enhancing technologies allow incumbents to retain some value in prior investments and reduce the extent of change for actors within the value chain.

Competence-destroying technologies, on the other hand, are technologies that draw on fundamentally different knowledge and resources in their construction (Anderson and Tushman, 1990). In many cases, these technologies are introduced by new entrants to an industry, because these firms are unencumbered by the established practices and relationships with customers or suppliers that constrain incumbent firm's motivation to pursue radically different technologies (Christensen, 2003). Rothaermel and Hill (2005: 58) describe biotechnology as a competence-destroying technology because it represented a "radically different scientific paradigm for discovering and developing new drugs". Prior to its introduction, pharmaceutical firms used chemical screening to discover and produce drugs. However, biotechnology made it possible to achieve scale with these processes at significantly reduced costs. Competence-destroying technologies have also been introduced through partnerships between incumbents and new ventures (Anderson and Tushman, 1990; Rothaermel and Hill, 2005), but new ventures have remained important conduits in the process.

New technological trajectories have changed products, firms and systems (Jenkins and Floyd, 2001). A product is comprised of components, which are a "physically distinct portion of the product that embodies a core design concept" (Henderson and Clark, 1990: 11). Examples of components in a product include the materials that are used to construct a product (Funk, 2008), and the competences that are required to utilize the resources in meaningful ways (Ehrnberg, 1995). Once a dominant design is established, components are often combined in unique ways into an architecture or system that links them together in a product. The products then stabilize, with little variation to the components or underlying concepts across models (Afuah and Utterback, 1997). Any changes to the component and system of a product necessitate changes to linkages that connect them (Henderson and Clark, 1990).

The different materials used in the production of a given product also change the rate at which innovation occurs (Funk, 2008). Funk (2008) argued that different needs of customer markets change the product requirements and necessitate the use of different types of components to achieve those objectives. While changes in components initiate changes at the system and product levels (Bonaccorsi et al., 2005), creative destruction ultimately emerges when the system that connects the components are reconfigured to create new classes of products or new ways of doing existing tasks. Therefore, our theorizing conceptualizes creative destruction at the system level which opens new possibilities and ultimately drives changes at the product level, where new product classes are created and customers are affected. Moreover, as it is generally the emergence of a new product class that threatens incumbents through creative destruction (Christensen, 2003; Glasmeier, 1991), the focus here is on creative destruction that results in the substitution of an old product for a new class in an existing industry, or the creation of entirely new industries (Ehrnberg, 1995).

3. Regional characteristics and implications for creative destruction

The regional characteristics that influence creative destruction largely depend on the characteristics of firms that operate within the region. Regional firms and their corresponding industries determine a region's technical capacity (Tallman et al., 2004). When high concentrations of firms from the same industry exist within a geographic region, the industry is considered clustered within the region. A geographic cluster is defined as the geographic concentration of a focal industry, its customers, suppliers and support agencies that support the industry (Porter, 1998). These regions have grown in prominence due to the innovative success of exemplars such as Silicon Valley in California, Route 128 in Boston and the Research Triangle connecting the Raleigh, Durham and Chapel Hill, NC areas. In fact, cluster regions are pervasive across the U.S. and around the world (Bresnahan et al., 2001).

Research shows that cluster firms have outperformed other firms (Klepper and Simons, 2000a), by introducing more novel (Audretsch et al., 1998) and new products to the market (Deeds et al., 1997). It has also shown that cluster firms tend to exhibit a commitment to advancing the technological frontier for their respective industries (Saxenian, 1990). However, once a region evolves into an established cluster for an industry, it develops resources that support the industry incumbents for the represented technologies. Cluster regions also host a large number of industry

[1] As Editor Kenney acknowledged, the industry is currently facing another disruption in the smartphone, which has the potential to completely eliminate the utility of the watch as a time device.