Introduction

Change has often been recognized as a focal component of economic development. Starting from Schumpeter's celebrated contributions it has been embedded in economics and management science, as a factor promoting wealth and allowing opportunities to flourish. This book tries to delineate the peculiarities of change in the technological domain as mutually linked with entrepreneurship development. Technology as an agent of change generates opportunities that can be taken by an entrepreneurial organization. In that sense technology can support entrepreneurship, while, at the same time, through change, taking an entrepreneurial attitude may enable the generation of significant technological advancement and innovation.

*Entrepreneurship and Technological Change* includes a set of chapters that results from a collaborative process intended for collecting fresh empirical evidence to be interpreted according to the most recent theoretical advancements. This book has been developed in response to a growth of interest from academics, practitioners and policymakers in technology-based entrepreneurship as a source of firms' and regions' competitiveness. We try to put forward an original perspective: entrepreneurship is seen here as an act of newness as evoked by Davidsson et al. (2002) and a process of new entry (Lumpkin and Dess, 1996). The various essays in the book concentrate on the explanation of entrepreneurial initiatives, at both firm and collaborative level. Substantial space seems to be left in literature for such an approach (centered on tools, organizational implications, analysis of the challenges for the firm) based on the mutual links that entrepreneurship is claimed to have with technological change. A secondary but equally relevant purpose of this book is the diffusion of stimuli and thoughts for the practitioner community, that may benefit from a deep understanding of the dynamics and implications of entrepreneurial innovation and technological change.

The book collects contributions on technology entrepreneurship at a European level. This seems particularly important in the challenging present contingency of European economies, where such a topic is invoked as an agent of strategic renewal. A policy perspective, focused on the design of
proper technology entrepreneurship practices, institutions and agents (such as technology transfer by universities, incubator and other infrastructures; for a comprehensive review see Rothaermel et al., 2007), seems more appropriate in regimes of business and social continuity. In the present conjunctures our attention has been directed towards entrepreneurship as a factor at the epicenter of the hoped renewal.

In a previous editorial project (Cassia et al., 2006) we suggested entrepreneurial dimension can promote uncommon growth even in mature industries. Under the same perspective, the present book extends the perspective of analysis, hypothesizing that entrepreneurship itself can be fostered by technological change and progress.

EMERGENCE OF TECHNOLOGY ENTREPRENEURSHIP

Audretsch (2009) hints at the role of technical advancement and knowledge accumulation within different approaches in economic modeling. In the ‘Solow economy’ technical change is mainly ignored by analyses focused on productivity factors, and its role remains to be more to be inferred by unexplained residuals. The advent of the ‘Romer economic regime’ suggested the relevance of knowledge capital in globalization processes, yet routinized technological regimes seemed to dominate, with inevitable disadvantages for small firms and entrepreneurial ventures cannot rely on large-scale R&D expenditure. It is only in the context of an ‘entrepreneurial economy’ that these firms can benefit from knowledge input deriving from spillover phenomena and integration capabilities; in such a context, technology entrepreneurship plays a role in connecting the dots, exploiting knowledge and transforming it into opportunities. Byers (2010) provide a useful definition in this respect:

Technology entrepreneurship is a style of business leadership based on the process of identifying high-potential, technology-intensive business opportunities [...]. An attractive business opportunity consists of a great value proposition, technically feasible products, strong intellectual property, a sustainable competitive advantage, a large potential market, and a proven business model. It can be based on either a revolutionary breakthrough in technology or an evolutionary advancement; and it can target an existing market or create an entirely new one. This entrepreneurial process is relevant for both independent start-ups and within established corporations.

Their definition is relevant for at least two different reasons: first of all because it links the definition of entrepreneurship to the dimension of opportunity, which is a consequence of change; second because it refers to
technical change in its pervasiveness, occurring also in a catching up contexts (non-breakthrough innovation), or in established firms (acknowledging the paramount role played by corporate entrepreneurship).

As already mentioned, technology entrepreneurship as an academic field stems from Schumpeter and the evolutionist school, but only recently – with Entrepreneurial Orientation (EO) and Entrepreneurial Management (EM) paradigms – has been described as a strategic posture and organizational behavior, thus embedding the individual level and more fine-grained perspectives. Covin and Slevin (1991), Lumpkin and Dess (1996) and more recently Rauch et al. (2009) for EO, and Stevenson and Jarillo (1990) for EM, represent seminal work in the field and help in understanding the constructs and their implications for firm performance and development.

THE PRESENT APPROACH

The aim of Entrepreneurship and Technological Change is to provide a rich description of different entrepreneurial phenomena, by shedding new light on the links they have with change in the technological domain. To be sure, we do not suggest a systemic view of entrepreneurship; as such we do not provide the systematization of the body of knowledge on technological entrepreneurship. Rather, we aim at collecting intriguing evidence on how technological changes generate opportunities that entrepreneurs or entrepreneurial organizations can properly exploit, and showing that a particular entrepreneurial behavior can be a promoter of change in both technology-intensive and technology-adopting businesses.

From such a perspective we priviledged a style for the essay mainly focused on actions and initiatives by entrepreneurial individuals and organizations, and corroborated with several empirical analyses suited to illustrate and describe powerful theoretical relations.

Contributions come from different disciplines and research domains. The value of cultural contamination coming from such a diversity is peculiar to our belief and motivation as researchers. Different perspectives (e.g. innovation management and R&D policy) collected around a common fil rouge (the concept of entrepreneurship as interpretative lens) gain value in a context of cultural diversity which is peculiar to entrepreneurship as a research domain as well as to entrepreneurs’ initiatives as a practical actions. The collection of contributions indicates common traits, but also testifies the richness of approaches and perspectives from which it is possible a study of the entrepreneurial phenomena. Yet many views of entrepreneurship have to be discovered and we believe, due to the complexity of researched topics,
that strategies based on integration of knowledge from different disciplines may be significantly more robust than those based on specialization.

The conceiving, structuring and preparation of the book have been characterized by a collaborative nature and a spirit of continuous and highly enriching interaction among editors and contributors. Actually, the present volume is the result of a process we have been honored to coordinate, interacting with many colleagues and scholars in the field. We started launching a call for contribution through personal contacts as well as academic networks. Attendance to a number of research conferences on entrepreneurship during 2009 and 2010 allowed us to get also acquainted with other esteemed colleagues and stimulating pieces of research. This process resulted in several contributions (both full paper and extended abstracts) which have been thoroughly evaluated according to the relevance of the topic and the coherence with our research perspective.

We selected ten contributions as a priority for the inclusion into the book, and then, in order to stimulate some interaction among contributors, we organized an international workshop, which took place at the beginning of May 2010 at the University of Bergamo. Each chapter was presented there and received two discussions, one from the editors and one from a different contributor. The workshop was the occasion for a very stimulating debate on different experiences and views on technology, change and entrepreneurship. It proved also a very effective way for adding value to each contribution, which benefited from specific comments and reviews, as well as from the view of the editorial project as a whole. Each contribution underwent a revision process by authors, and a second double review process with the same logic as in the workshop.

THE STRUCTURE OF THE VOLUME

The collection deals with a major research aim, that is exploring the link between entrepreneurship and technological change: how does it unravel? Which environmental as well as organizational conditions favor the fostering, in either direction? The various contributions fall into three parts which we hope suited to represents the main traits of a journey through the recent advancements in knowledge on entrepreneurship and technical change. The first part provides conceptual roots for the interaction of entrepreneurship and change in the technological domain, while the second part focuses on the notion of renewal that can be associated with entrepreneurial behavior and results from technological change, both exogenous and endogenous to the firm, either in industries or in regions. The third and last part maps frameworks which derive from innovation literature (and are normally
adopted to explain patterns of technological change), by explicitly linking them with the entrepreneurship construct. A more detailed account of the content of the single contributions is provided in what follows.

Part One (Understanding change and entrepreneurship in the technology domain: foundation for a mutual causality) provides elaborations at the mainly theoretical level which reinforce the initial intuition that generates the book, i.e. that entrepreneurship and technological change can be mutually fostered through specific organizational postures. Such strategic behaviors are analyzed in depth by Cassia, Minola and Paleari, through an extended literature review on most qualified academic journals in management, entrepreneurship and innovation. The contribution discusses the main dimensions of entrepreneurship under the lens of recent academic advancements on knowledge and change as agents of economic development. The chapter concludes by suggesting a framework that can help and guide the reader in the remainder of the book. In particular the framework explains how technological change, including interaction with the environment, can generate opportunities that ignite entrepreneurial actions; and how a firm’s entrepreneurial posture generates innovative practices (some examples are provided, e.g. ambidexterity or dynamic capabilities as innovative responses to external stimuli) that in turn promote technical change.

Günzel and Wilker describe the opportunity recognition and exploitation process enabled by the development and use of a new technology. The chapter contributes to the understanding of the interrelationship of technology entrepreneurship and change by proposing the Business Model Dynamics Framework (BMDF); it is a dynamic design tool that enables value identification and quantification for all types of opportunities and encourages change during all stages of a firm’s development.

Part Two (Technology entrepreneurship and the renewal: firms, industries and regions) highlights the renewal dynamics that are associated with contexts where entrepreneurship flourishes. Roaldsen and Borch dedicate their attention to SMEs in mature industries, where severe competition and structural constraints to innovation make renewal a particularly desirable result of firm strategies. The authors explain how strategic entrepreneurship can induce firms to engage in R&D-based alliances; they are in turn attractive means to achieve the necessary resources for technical change. In mature industries such alliances result in a strategic renewal of SMEs.

Hedner, Cowlrick, Wolf, Olausson and Klofsten analyze the pharmaceutical industry and its changing structure; costs for radical innovation are shown to continuously increase, whereas the outcomes (e.g. business survival and growth, drug delivery) do not improve correspondingly. Many large pharmaceutical companies have relied heavily on mergers and acquisitions to overcome such innovation failure. There is an
increasing focus on emerging alternative approaches, such as the creation of open models of innovation which rely more on employees’ entrepreneurial engagement and focuses; thus more and more companies are reorganizing their structure into smaller, strategic core competence groups headed by entrepreneurial leaders. The chapter discusses corporate executives’ perception of the importance of openness and an entrepreneurial approach to the drug delivery process for possible rejuvenation of the whole industry.

Muffatto and Giacon describe entrepreneurial behavior in high-tech investments by considering them key drivers that influence both corporate change and the regional model of industrial specialization. The exploitation of technological discontinuity, especially in traditional industries, represents a crucial and complex strategy that requires low risk aversion, entrepreneurial commitment and strategic vision. This entrepreneurial posture is detailed through dimensions such as the conceptualization and the assessment of high-tech investments, and a description of drivers of the strategic choice to invest. The chapter concludes with some considerations on how single initiatives of investment can become collective outcomes and thus influence the regional model of industrial specialization.

Svensson concludes Part Two by describing the industrial change of a Swedish urban region, which illustrates in detail how regional renewal occurs; a new knowledge base, in particular an emerging technology, in a declining industrial city can spill over into the surrounding environment. The chapter analyzes through a qualitative approach which are the actors of such a renewal process, the strategic perspective, the innovation outcomes and summarizes the main issues of the design of a regional collaborative strategy and some policy implications.

Part Three (Strategic entrepreneurship and innovation: challenges and processes) represents the final step of the journey; innovation patterns enable technological change and are linked to entrepreneurship, although this link is often implicit and taken for granted. This part aims at explaining which entrepreneurial dimensions facilitate and promote different forms of technological change through innovation; the analyses are performed at the firm level. Cassia, De Massis and Minola suggest corporate entrepreneurship initiatives are unquestionably an important element for the long-term performance of growth-oriented companies; the authors focus on corporate venturing as a specific form of corporate entrepreneurship that enables a particular type of technological innovation, i.e. the entry into a technological new business domain. An exhaustive classification of corporate venturing forms is provided, where the specific role of technological discontinuity objectives in corporate venturing is highlighted, together with a framework to assist corporate executives in selecting potentially suitable forms.
Foss, Iakovleva, Kickul, Ofteval and Solheim stress the relationship between innovation as a ‘product’ and the entrepreneur as the active agent bringing it into the market. Different types of innovations are addressed, to understand whether they encounter different entrepreneurial challenges. The chapter suggests how entrepreneurs may overcome the challenges associated with radical and disruptive technologies by leveraging on different entrepreneurial and strategic drivers (among which is a balance between soft and incremental innovative patterns).

Faems, Visscher and Lamers concentrate on rapid growth SMEs (named as ‘gazelles’) and conduct a dynamic and longitudinal analysis; they show how exploration intensity, required for a sustained technological change, can successfully evolve over time according to proactive responses to environmental condition.

Viala and Léger-Jarniou also focus on entrepreneurship as a source of innovation and performance, within existing organizations. The developed conceptual model illustrates a way to implement corporate entrepreneurship dynamics with specific regard to the use of information technology.

Mortara, Napp, Ford and Minshall suggest a theoretical bridge between corporate entrepreneurship and the paradigm of open innovation; two recent concepts that stand out as modes through which established firms can attempt to innovate. Surprisingly few research has focused on the explicit links, so the authors provide a number of examples and modes of open innovation in practice and a preliminary framework to evaluate the entrepreneurial level of each mode.

Let us finally noted that empirical evidence has been collected here to illustrate technological change dynamics and clarify the mutual causality relation existing with entrepreneurship. A conceptual map in this respect is provided in Chapter 1 and is then detailed in the remainder of the book, through several empirical examples, deep-rooted in the domain of technological innovation literature. Together with the uncommon approach to technology entrepreneurship, this is why we hope that the community of interested scholars will receive this volume as a suggestive exercise and a stimulus for further and deeper research.

REFERENCES


