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# Introduction

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Putting together a *Handbook on Industrial Policy* appears challenging at first sight. Both the reflections within industrial economics and the practical experiences over time and across the world point to a richness of contexts, approaches, factors and determinants that make it difficult to define the problems and delineate the fields of application. Hence we chose to start from empirical observation to arrive at general properties and systematic characteristics that theoretical perspectives should take into account and explain (an approach that classical economists took, and that the pioneers of industrial economics such as Bain also adopted).

The *Handbook* has been put together with the aim of providing an overview of all the approaches and relevant themes of the ample field of industrial policy. Our objective was not to promote a particular approach or school of thought. We think it is a task of the reader to derive the most relevant questions and the most relevant approaches from the richness of perspectives proposed in the *Handbook*. All chapters are written by specialists with deep knowledge of particular sectors, regions or policy fields that they have observed empirically. This makes it possible to point to relevant current policy issues and derive implications for theory and methodology.

The meaning of the term 'industrial policy' has changed a lot over time. Until the 1980s, the term meant the direct intervention of the state in the economy, the direct control by the government of large parts of the production apparatus and a set of public actions aimed at limiting the extent of the market and at conditioning productive organization. Nowadays, the term 'industrial policy' indicates instead a variety of policies which are implemented by various institutional subjects in order to stimulate firm creation, to favour their agglomeration and promote innovation and competitive development in the context of an open economy. The new industrial policies are therefore mainly industrial development policies, where industry is implicitly considered as the organization, and the strategic management of human competencies and technical capacities. Industry in this sense is the main driver of what we may call the Wealth of Nations, meaning the capacity to produce and distribute wealth within a community.

Some important changes have indeed occurred in the economy and have generated the need for firms to adapt and restructure. These changes are manifold, ranging from purely economic aspects (increase in world trade, improvements in financial markets), to technological ones (diffusion of the information and communication technologies) and political ones (end of the division of the world into two political blocks). All these changes are often confused or only partly considered and we think they all constitute what everyone tends to call 'globalization'.

Globalization, understood in this sense, has led to the necessity for firms to undertake dramatic structural changes. Very often firms have called on governments for help: to better understand the changes going on or to be directly supported. As a result, the new industrial development policies have been defined within the constraints imposed by

international agreements such as the WTO rules or the European Union legislative framework for European states.

Industrial development policies are all policies aimed at favouring and accompanying structural change. They are dynamic in nature and primarily consist of programmes that evolve over time according to the evolutions of the economy and its context and according to the realizations achieved. It is possible to define two broad sets of policies. First, there are policies aimed at defining the rules of the competitive or competitiveness game. These are anti-trust, property right legislation, international rules on world trade, and so on. Second, there are policies aimed at providing or improving firms' and individuals' capabilities to take part in the competitive game. These are technology and research policy, training and education, policies favouring linkages between firms, universities and local or regional authorities, and so on.

We have therefore articulated this *Handbook* around these themes, defining four axes that also fit the information that emerges out of not only the economic literature but also the documents published by the European communities and by other international institutions. These four axes constitute the four main Parts of this *Handbook*.

First, there is an important part that we have to call 'market opening' that is centred on the actions aimed at integrating capital and product markets so as to increase the extent of the market (Chapter 3). It also includes actions aimed at helping agents to take part in the global competition game (Chapter 4) and actions aimed at helping to exploit the opportunities of the global game (Chapters 2 and 5). Hence these actions require an analysis of the changes in worldwide production processes, that is performed by the authors of Part I of the volume. Thus Arora, Gambardella, Lall and De Bandt show, among other things, the emergence of global-scale production systems where firms from developing countries may develop capabilities that are complementary to the capabilities of firms in developed countries.

The second axis which we think is emerging is that of the 'rules', that is, market and competition guarantee, that includes the redefinition of the role of anti-trust authorities (Chapters 6, 7 and 8), the actions of privatization of public services and the regulation of the risks of creation of new monopolies (Chapters 9 and 10). This axis is therefore one concerned with ensuring that markets function efficiently and that competition is as free as possible (Chapters 6, 7 and 8). In today's globalized world the problem of the national state no longer being the ultimate reference of economic development and the absence of a world authority able to guarantee the rules of the game is strongly felt, as are the problems of taking account of market dynamics in competition cases (Chapters 6 and 8).

The third axis concerns both rules and capabilities. It is about the role of research, of innovation and of the so-called 'new science – new industry' relationship in making markets and competition more dynamic. Innovation requires the two extreme levels of industrial policy: national or supranational regarding the definition of rules such as property rights; and local regarding the creation of knowledge (spin-offs and science parks examined in Chapters 13 and 14), that is, capability building. Regarding rules, the changes outlined above have led to the definition of new property rights regimes such as the open source model (Chapters 11 and 12). Innovation policies also interact with other policies, such as social policies (Chapter 15).

The role of local realities constitutes the fourth axis of the new industrial development policies, which is the core of their capability-making aspect. Local realities and therefore

territories have been rediscovered as important determinants of productive development, in particular through the role of SMEs and their clusters (of which industrial districts represent a type), especially when they are locally rooted and when the territory is taken as a resource that can be exploited (Chapters 16, 17 and 19). For this purpose, provision of local public goods such as business support services is essential (Chapter 18). Decentralized industrial policies have proved to be useful but their effectiveness depends on their being integrated to a national (centralized) strategy (Chapters 16 and 19).

The analysis conducted within the four axes points to a number of issues regarding, not only the practical implementation of industrial policies, but also their analysis in the field of economics. Hence Part V of the *Handbook* focuses on methodological and conceptual issues. A specific consideration of the important tool that has greatly influenced industrial economics, namely game theory, is first undertaken, showing that game-theoretical analyses have increasingly taken dynamics into account (Chapters 20 and 21).

The *Handbook* is concluded by a particular view of concepts and approaches (Chapter 22). Overall, we think that the *Handbook* shows that, while the concept of industrial policy has been put to one side for a long time, numerous scholars have continued working on the subject and have developed a very rich field: studies are rich in methodological and conceptual approaches, in theoretical and empirical considerations, hence the very fertile and influential field.

The new industrial development policies turn out to be programmes or strategies (objectives and means) of industrial development defined by a country or a group of countries (as in the EU). They primarily aim at providing the conditions for business performance, but they also include, as experience throughout the world shows, measures aimed at sustaining and promoting industrial restructuring, that is, at orientating comparative advantages (specializations).

We provide below a brief summary of each chapter in order to guide the reader through the *Handbook*.

### **Part I Industrial policy in a global perspective**

Patrizio Bianchi and Sandrine Labory provide an analysis of the new industrial development policies as they emerge out of the contributions to the *Handbook*, together with a historical perspective and theoretical interpretation of the move from 'old' industrial policies to the 'new' industrial development policies. The main characteristics of the new policies and the implications in terms of research agenda are pointed out.

The chapter by Ashish Arora and Alfonso Gambardella discusses a number of questions raised by globalization on the basis of an analysis of a particular case, that of the significant growth of software production in some emerging economies. The chapter discusses the effects of the rise of the software industry in five countries – Brazil, China, India, Ireland and Israel – on the development of the sector in the USA, Europe and Japan. It is shown that, while the USA is likely to remain an important R&D centre for software, specializing in high value-creating phases of the production process, Europe and Japan incur more risks, essentially because they are not as able as the USA to attract a skilled workforce from the emerging countries and because the ability to relate to the firms in the emerging countries which have complementary activities is higher in the USA. The analysis of the chapter has a number of implications, including countries' specializations, outsourcing and human capital policies.

Chapter 3, by Jacques Pelkmans, examines the evolution of industrial policy in the European Union. It first provides a rigorous analysis of the decision-making framework for industrial policy within the European Union, given by the rules defined by the Treaties. It explains the two levels of application of industrial policy, namely national and European, and shows the complementarity of the two levels. The chapter thus shows the overwhelming importance of European integration in determining structure and performance of industry in Europe, as a result of the deepening, widening and enlargement of the EU.

Sanjaya Lall determines how proper industrial development policies should be elaborated in order for countries' competitiveness to improve, on the basis of an analysis of the East Asian experience. He reviews country performance over the period 1980–2000 in the developing world in terms of market shares for manufacturing value added and manufactured exports. He shows that the countries that performed best were East Asian ones. Within the East Asian region, the best performing were those, such as Korea and Taiwan, which implemented comprehensive industrial policies, that is, policies aimed at both the rules (effective institutions, bureaucracies, regulation) and capabilities (sustaining domestic firms). Thus most of them used infant industry protection, export subsidies and targets, credit allocation, local content rules and so on to build their industrial capabilities base.

Jacques De Bandt provides some considerations in Chapter 5 on the changes that economies are experiencing worldwide and the consequent need for industrial policies. He stresses that what is going on is very complex to understand and is inducing a change in production systems, whereby knowledge management and creation is fundamental. Hence the economy is turning to a 'knowledge-based' economy in the sense that methods of production involve intense knowledge creation and management. Industrial policy should therefore change objectives and priorities. Policies should help to understand the complexity of production realities and systems and, on this basis, provide appropriate training to the population, promoting multidisciplinary approaches, system analysis and modelling, information and knowledge engineering, and so on. Thus policy should help develop competencies, the capabilities for producing and transforming knowledge into operational solutions or applications. The organizational set-up that implements policies should also be carefully designed, with an emphasis on the 'bottom-up' approach, but 'with the understanding that the emphasis is not on individual actors, but on specific decentralized production systems'.

## **Part II Competition and regulatory issues**

Chapter 6, by Jo Lorentzen and Peter Møllgaard, examines the implications of the intensification of innovation for competition policy. It has indeed been argued that globalization has meant increasing importance of innovation for firms. To face the challenge of more frequent innovation, one strategy that firms have been adopting is to form technological alliances. Policies have favoured such collaboration in order to increase innovation and its diffusion. However, these policies raise questions for anti-trust policy, since collaboration may continue at the final stages of production. The chapter examines this paradox. First, a review of the rationale behind technological alliances is presented. Second, the organization of industries in a dynamic context is analysed and consequences for competition policy are derived. The authors conclude that, despite the complexity of analysis, competition authorities should monitor the behaviour of high-tech firms during and also after judging cases. The authors call for more empirical research on where

technological trajectories, especially in the new sectors, are heading. For this purpose, multidisciplinary research is needed.

The chapter by Stephen Martin and Paola Valbonesi provides an objective and complete account of state aid in both the European Union and the USA. The authors show that state aid is present in both regions, despite legal impediments and resulting economic inefficiencies. They first review the main theoretical literature on the subject, namely strategic trade policy, tax competition and rent seeking, and conclude that none of the literature makes a case for state aid as an efficient or welfare-improving tool. The authors subsequently review the legal framework for state aid in the USA and the EU. The main competition-distorting question raised by state aid concerns inter-state competition in the USA and inter-member state competition in the EU. The empirical evidence is that, in both regions, state aid is still implemented in significant amounts. In the EU, enlargement to Central and Eastern European countries also raises new issues for state aid, since these countries employ these instruments to help their convergence to the rest of the EU.

Hans Schenk concentrates on the anti-trust case of mergers in Chapter 8. He shows that, although mergers and acquisitions operated by firms in all industries represent enormous value, since firms spend amounts comparable to countries' GDP to merge with or to acquire other firms, empirical studies do not provide evidence of positive efficiency effects of these operations. Evidence, however, is mainly on static efficiency effects, not dynamic efficiency effects. The author goes on to review empirical practice in the treatment of merger cases by competition authorities in the EU, the USA, Canada and Australia. Here again, dynamic efficiencies have been considered only in a few cases. The author shows that each region tends to have its own system without international coherence.

Chapter 9, by Tom Björkroth, Sonja Grönblom and Johan Willner, deals with theoretical and empirical aspects of liberalization and deregulation of public utility sectors. The theoretical part of the chapter analyses the impact of competition and ownership on allocative efficiency and the significance of the cost structure for the possible trade-off between the imperfections associated with different regimes. Theory seems to suggest that the threshold for liberalization to be beneficial may be higher than usually believed. The empirical part focuses on telecommunications and electricity provision, with short discussions of other industries such as water and public transport. Deregulation in telecommunications has in most cases been followed by lower prices, but some incumbents were also technically progressive, and in those cases there are some question-marks related to the counterfactual. Similar concerns have been raised in the energy sector, but there have in addition been doubts about reliability, lost advantages of vertical integration or excessive consolidation.

The chapter by Andrea Goldstein concludes Part II on competition and regulation, concentrating on nationalization versus privatization issues in both developed and developing countries. The chapter reviews alternative explanations of state ownership as a tool of industrial policy. It provides evidence on the role that state-owned enterprises (SOEs) played in the economic growth process of some developed and non-developed countries, on the motives for privatization, on the conditions in which SOEs have been sold and on the effects of such a policy choice. The case of France is also discussed in more depth. Goldstein concludes that the institutional framework within which privatization is undertaken is very important in determining its success or failure; governments should be as objective as possible, in the sense of resisting ideology, in order to raise the probability of success.

### **Part III Research, technology and innovation**

This part contains five chapters, each of which deals with specific key issues regarding technology and research policy.

Fabrizio Cesaroni and Paola Giuri analyse the crucial issue of innovation protection. More specifically, the authors examine two models of intellectual property protection, namely the strong intellectual property rights (IPR) model and the open source/open science model, and their implications for innovative activities and market dynamics. The IPR and the open science models present advantages and disadvantages in terms of incentives to innovate, adoption of technological innovations and diffusion of technologies. The chapter focuses on some key and emerging issues on intellectual property protection and examines the effects of (stronger or weaker) patent protection on the innovative activity of large and small firms and on entry and growth of new technology-based firms. The main policy implications are, first, that the pros and cons of each model are influenced by the differences in the characteristics of the various industrial sectors; second, that the presence of complementary assets also influences the preferred model.

Nicolas Jullien and Jean-Benoît Zimmermann also analyse the issue of the IPR versus the open source model of intellectual property protection, arguing that intellectual property protection is in practice always the result of a compromise between the various actors involved: producers, consumers and public authorities. Historically, protection has experienced phases where stronger and weaker protection have alternated. The authors argue that, in the software industry, the trend tends to be towards weaker protection, as shown by the diffusion of the open source model. More generally, in the knowledge-based economy the trend should be, contrary to what tends to happen nowadays, going towards weaker protection since there are enormous gains to be made from the sharing of knowledge and innovation as realized under the open source model.

The definition of intellectual property rights is crucial in determining the incentives to innovate and to commercialize innovations. Such commercialization generally arises out of spin-offs from existing companies or from universities. Marco Giarratana and Salvatore Torrisi analyse spin-offs in detail, addressing a number of questions. Are they an important form of science-based entrepreneurship? Where do they come from (academic institutions, established firms)? What about their post-entry performance relative to other new science-based or technology-based firms? Why do some countries and institutions differ in the rate of new science-based firms formation? The authors answer these questions first by illustrating the importance of science-based industries and spin-offs; second, they explain the empirical evidence using different theories; and third, they analyse different policies aimed at science-based spin-offs.

The creation of science parks and business incubators particularly favours spin-offs. In Chapter 14, Jan Annerstedt reviews the theoretical and empirical evidence on a particular form of innovative networks that has been a focus of technology policy over recent years, namely science parks. Science parks are geographically limited areas where business, private and public research centres and local governments are brought together in order to create 'innovation environments', that is, environments where the close and dense network relationships between the various actors of innovation favour innovation and firm creation. The chapter reviews the historical evidence on science parks and defines three generations of such parks, with an increasing integration of the parks into the local urban areas and into global flows of knowledge. The chapter subsequently goes beyond the science park

evolution to address more general policy-relevant issues of locally based clustering of innovative firms and their supporting institutions. Science parks are areas that favour firm creation, be they start-ups or spin-offs from public institutions or from companies.

Daniele Paci and Stuart Schweitzer present an interesting and often neglected issue related to technology and research policy, namely the interaction between technology policy and other policies. They concentrate on a high-tech sector, the pharmaceutical sector, and make two points. First, the way a sector is defined in the analysis influences the policy implications one reaches; second, taking a broader view allows us to take important interactions between policies into account. Thus defining the health industry as comprising all the sectors that realize products aimed at providing health services (medical machinery, drugs and so on) with a market composed of not only patients but also health ‘providers’ (doctors, chemists and so on) leads the authors to outline crucial trade-offs, such as the interaction between technology policy that aims at favouring innovation in the sector allowing for monopoly rents over innovations (patents) and social policy that aims at providing health to all at low cost, hence favouring competition between firms.

#### **Part IV Territory, industrial development and small firms**

Part III showed that industrial policy in practice has had a tendency to decentralize, in line with the new ‘bottom-up’ approaches. Thus high-tech clusters have been a focus of technology policy in many countries over recent years. Part IV is therefore specifically dedicated to local industrial development and policies.

Leandro Sepulveda and Ash Amin start this part by providing an analysis of the new decentralized industrial policy approach. They argue that this new approach has many merits, but at the beginning of its implementation there has been a tendency to decentralize too much and forget the importance of centralized policies. If industrial development is first and foremost localized on specific territories where it embeds, some degree of centralization is also required, in order to define coherent rules throughout the country and to allow successful experiences to spill over into other regions of the country. These arguments are illustrated with the case of Argentina.

Marco Bellandi and Marco Di Tommaso then go deeper into the analysis of the rationale and forms of local industrial policies, that is, the local dimension of industrial policy. They also stress that local industrial policies have to be coherent with strategic objectives defined at a more central level. They carry out a deep and rigorous analysis of local industrial policies and show their various dimensions. They also show that the fundamental reason for the local level of industrial policy is that industry develops only if it embeds locally. This ‘embeddedness process’ determines the success of industrial development and can be supported by the public provision of public goods of various types.

In Chapter 18 Nicola Bellini examines a particular kind of local industrial policy, namely business support policies. These policies are specifically aimed at assisting enterprises or entrepreneurs to develop their businesses and to respond effectively to the challenges of their business, social and physical environment. The chapter discusses three main approaches that are based on different research paradigms. It ends by pointing to the lack of evaluation of these policies. According to Bellini, evaluation is rarely carried out owing to the many difficulties of this exercise, such as technical difficulties which are explained in the chapter. However, evaluation has started to be performed in various ways. One example

is analyses testing the additionality of business support policies. Other examples are examined, showing that evaluation should be a priority on the research agenda.

Local industrial development primarily involves the creation and development of small and medium-sized enterprises (SMEs). The last chapter of Part IV, by Patrizio Bianchi, Sandrine Labory, Daniele Paci and Mario Davide Parrilli, focuses on SME policy. It provides an overview of the policy tendencies in both developed and developing countries, focusing on three continents, namely Europe, Latin America and East Asia. It shows that globalization has led to the focus on networking as a tool to consolidate SME development. The comparison of SME policies in developed and developing countries leads the authors to conclude that developing countries often have SME policies but which lack coherence such as is provided, for example, in Europe by the European decision-making framework. In addition, attention is often focused on the larger firms among SMEs and not on the myriad of very small firms that represent an important share of employment and contribute significantly to socioeconomic stability. This therefore risks creating a fracture within the national production systems.

### **Part V The use of game theory in industrial policy analysis**

The various chapters of the *Handbook* so far have shown that globalization poses new challenges not only to the practice of industrial policy, that is, policy decision making and practical implementation, but also to the analysis of industrial policy by economists (and possibly other scholars). Part V addresses these challenges in more detail, focusing on an important tool of industrial economics, game theory.

Chapter 20, by Luca Lambertini, shows how game theory has come to play an important role in industrial economics, providing a rigorous objective tool for the theoretical perspective. However, only the static game-theoretical framework was first used extensively. This approach has a number of drawbacks, including restrictive and often unrealistic assumptions and the sensitivity and variability of results to the particular assumptions made. Hence this perspective has been increasingly questioned, not least because of the evolution of the competitive conditions and of the industrial policy problems faced by decision makers to which static game theory was increasingly unable to provide satisfactory answers.

Dynamic game theory has developed recently and rapidly. The first chapters of the *Handbook* show that looking at the reality of industrial development and policies leads to evidence that a proper approach is necessarily dynamic. In fact, Roberto Cellini and Luca Lambertini in Chapter 21 show how results and policy prescriptions change when dynamic rather than static games are considered.

### **Part VI Particular views**

Christos Pitelis reviews the various methodological approaches to industrial policy analysis, focusing on the example of the EU and providing a bird's eye view of extant alternative perspectives on industrial (and competition) policies. The chapter also derives implications in terms of industrial development policies in developing countries.