

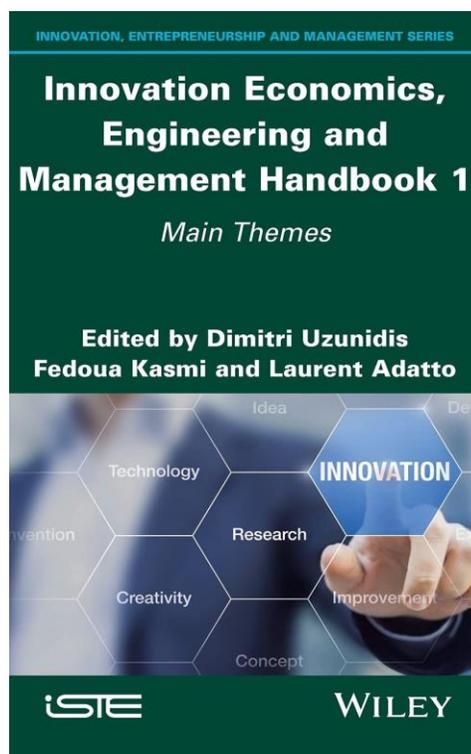
UZUNIDIS D., KASMI F., ADATTO L., 2021, Innovation Economics, Engineering and Management Handbook, Editions ISTE/Wiley.

Entitled *Innovation Economics, Engineering and Management Handbook*, the recently published English-language encyclopedic sum analyzes contemporary innovation processes related to information society, knowledge economy, interactions between research and business models, agile methods, adaptation to change, wealth creation and development of socially and environmentally sustainable growth.

Within a high number of chapters, the generation of innovation is studied at different scales, local, and adjoining networks and globalized economy. The theoretical background of the constituent elements of the innovation field is reminded in order to enlighten the conceptual analyzes and do not reserve the reading to the only experts.

Two volumes with complementary range were constituted. The first one is devoted to the foundations of innovation, in particular for a readership that includes economists, managers, historians and engineers involved in the field. The second volume analyzes the concepts of innovation from a contextual and prospective approach.

VOLUME 1 - MAIN THEMES



Economy - The first contribution of this volume reviews the foundations of the definition and evolution of the major issues of the innovation economy, its measurement, its key players and the need for their interactions in a systemic dynamic.

Management - How to manage innovation? Space seen from the point of view of organizational boundaries; time by taking into account the emblematic processes of innovation; and matter (the material version of innovation: product, service...) and its appropriation, turns out to be key elements of the answer to this question.

Agriculture - The renewal of the concept of innovation in the field of agriculture is studied. The specificities of agricultural and food activities that make these

activities interact and the use or conceptualization of innovation are questioned.

Anthropology - Innovation is analyzed through the lens of anthropology by examining the characteristics of the anthropology of innovations. Anthropology provides the intellectual tools to understand how innovations transform society while pointing to the complexity of the change process.

Business - The difference between the commercial and business ecosystems is addressed. The territorial dimension is minimized in CE unlike BE, which also emphasizes coherence that is reinforced by appropriate public policy measures.

Capacity - Innovation is not limited to technology transfer, it is the capacity to innovate that conditions

the innovation dynamic. The link between innovation capacity, collective learning and the interest of building competencies within innovation systems are analyzed.

Capital - The concept of knowledge capital is also studied. A conceptual framework is developed in order to understand the mechanisms of knowledge production and management in the firm and their importance in innovation.

Cluster - The association of geographical and «virtual» proximities in innovative clusters is analyzed. Particular attention is given to the influence of the Internet revolution, and information and communication technologies in these clusters.

Collaboration - The guiding concepts and basic notions associated with open and collaborative innovation are presented. A brief history, as well as the main occurrences in the literature from different fields, are highlighted. Discussions and criticisms of the openness aspect of innovation processes are raised.

Creativity - In the first volume, we also examine the encounter between the fields of innovation and creativity. The way in which innovation has “instrumentalized” creativity is highlighted, while showing how they have reciprocally influenced each other in the way they think and practice each other.

Cycles - The long movements of the economy and the question of innovation are brought together. Innovation is identified as a key driver in the cyclical evolution of the economy due to its transformative potential.

Design - Despite the free nature of innovation, the implementation of a structured approach based on innovative design methods is essential to eliminate the fixation effect.

Diffusion - Approaches to the diffusion of innovation are discussed. On the one hand, there is the epidemiological approach, which gives a central role to information, and on the other hand, there is the individual choice approach, which emphasizes the heterogeneity of potential adopters. Policy externalities play an important role in the diffusion phenomenon.

Disruption - Disruptive innovation is defined; not as a breakthrough or simple technological advancement, but rather a bottom-up innovation that offers a new combination of value to disrupt the existing market and displace established businesses and products.

Ecosystem - The notion of an innovation ecosystem here emphasizes the importance of informal actors complementing formal organizations and institutions. To better analyze this vision, the different theoretical approaches to this notion, and the main characteristics of innovation ecosystems are analyzed.

Entrepreneur - Is the entrepreneur an actor of change or an agent of change? In the first volume, the evolution of the function of the innovative entrepreneur is discussed.

Financing - The question of financing innovation is

addressed. The role of information asymmetries on financing is discussed, as well as the reasons for the reluctance to finance, while pointing out the importance of public intervention to finance innovation.

Frugality - Frugal innovation is defined here as a new technological paradigm. It differs from other similar types of innovation and is presented as a response to environmental concerns and sustainability issues.

Future - The different trajectories envisaged for innovative technologies in different fields (such as virtual reality, neuroconnection, health or space industry) are analyzed as well as the imaginary and technological ideologies that go with these mutations (such as science fiction, cyberculture or transhumanism).

Hybridization - The importance of tools such as the «DRL - Demand Readiness Level» in the acceleration and agilization mechanisms of all collaborative innovation processes is also highlighted.

Incentives - The theoretical underpinnings that favored the development of the theory of incentives are categorized and the different forms of incentives and their applications according to the characteristics of the company, the sector of activity and the competition are analyzed.

Indicators - Indicators for measuring the effects of innovation on growth, competitiveness, and social and environmental issues are listed in this volume. The approach by inputs (human and financial means) and outputs (innovation rate, patents filed and scientific publications) is mobilized and the limits of these indicators are discussed.

Information - The meaning of intelligence is associated with the informational supply necessary for the innovation process. The notions of «classic», «creative» and «strategic innovation» intelligence are articulated to explain the specificities of an information search.

Invention - The notions of competitive innovation and shared invention are brought together. Their cohesion is based on the sharing of knowledge, the management of intra- and inter-sectoral competition, and the management of technological change.

Knowledge - Knowledge Management (KM) is presented as the process of coordinating talent, systems and organizational structures to innovate and create value in accordance with a strategic vision. Learning organizations, KM strategies and KM tools are analyzed.

Location - The location of innovation is also examined by addressing the role of public actions undertaken to address innovation issues at a localized (sub-national) level and generate territorialized economic development.

Market - The multifaceted nature of business innovation is also highlighted and its relevance to business strategy is emphasized. The characteristics of this innovation and the conditions for its success are

also questioned.

Model - Business models are discussed as essential elements in the innovation strategy of companies. A typology of the elements of business models and the way they are linked together is presented.

Network - The issue of innovation networks is addressed. Collaboration with external stakeholders in a network is essential to innovation, it results in the creation of new resources for the company. But the question of space and territory also plays an important role in the formation and sustainability of networks.

Organization - As innovation processes become more open, new organizational structures for innovation have emerged. Three organizational structures for innovation are identified and their models discussed. The first concerns the R&D project system, the second the startup-venture capital system, and the third the emerging structure called the industrial platform system.

Paradigm - A historical review of the techno-scientific paradigm, source of major innovations (such as the Internet), is also presented. Its critics (notably neoliberal) are raised.

Pattern - The main «innovation models» are analyzed. Starting with the analysis of the linear model of innovation (basic and applied research and technological development), then the interactive models of innovation, which emphasize the links between the different phases of the innovation process and the increased consideration of the market. The hybridization of these models, depending on the context or the concerned fields, is discussed.

Persistence - The persistence of innovation is characterized by the diversity of its definitions. These are introduced in this first volume. The issues related to the measurement of this phenomenon and its explanatory frameworks are analyzed. The persistence of innovation in the firm is crucially linked to the dynamic capabilities of the firm that allow it to innovate persistently over a long period.

Policy - Innovating differently to face societal challenges is becoming an imperative. Innovation critics are now at the heart of the field of innovation studies and this change is accompanied by important transformations in innovation policies. However, innovation systems and the policies linked to them do not change easily because they are subject to powerful lock-ins.

Property - Is the intellectual property system beneficial to innovation? Critics of this system of protection are multiplying. Some researchers consider it to be a brake, leading to a risk of overprotection and possibly limiting the diffusion of works and the use of innovations.

Proximity - Do you have to be close to innovate? To answer this question, the positive and negative effects of geographical proximity on innovation, and then of non-geographical proximities, are analyzed.

Responsibility - The issue of responsible innovation is

also addressed in particular through the prism of research and responsible innovation. It is the subject of a double analysis, on the one hand on its adoption by public policies. On the other hand, its implementation by companies through corporate social responsibility.

Revolution - The transition from the technical revolution to the industrial revolution is also analyzed in the volume 1. Technical innovations are a major characteristic of the industrial revolution, or more precisely, of the progressive industrialization of the economy and societies.

Services - An analysis of the literature on service innovation is conducted. It takes into account the complexity of services. This complexity extends to service innovation, which makes it difficult to propose a comprehensive definition of service innovation.

Social - A focus on social innovation in economics and management is also carried out. The notion is first defined, with emphasis on the different governance logics of the associated creative processes. Two major issues of innovation are finally raised: its governance and its measurement.

Space - Does space matter? It would seem that, yes, innovations appear in all types of urban, peri-urban and peripheral or isolated rural spaces. However, there is a very strong urban hierarchy in which a few metropolises are at the top of the pyramid in terms of innovation production. Conversely, firms located in remote or peripheral areas would be constrained in their access to innovation resources, due to the low population density in these areas and the lower variety of resources available.

Standardization - Innovation management standards are defined in this volume as a voluntary process of specification development based on consensus among all interested parties (private and public actors). They provide recommendations or requirements that organizations can refer to, in order to improve their processes.

Synchronization - The role of coordination and synchronization between the actions undertaken by the members of innovation networks is studied. They help ensure the performance of an innovation project.

System - The concept of national innovation system (NIS) is analyzed. Its main contribution is to consider as significant and determining the relationships between organizations and actors that promote the realization of innovation. The NIS is essential to interpret the growth and technological competitiveness of states.

Tax - The taxation of innovation is also emphasized. The tax system plays an important role in supporting innovation. Between incentives and efficiency, it is a question of finding the right balance between attracting and not discouraging. Three main areas of the link between innovation and taxation are identified: incentives, attractiveness, and innovation policies.

Technology - A theoretical model of technology for

innovation is developed. It includes the following five stages: generation of the innovative idea, followed by a stage in which the feasibility of the idea is demonstrated, and then by a development phase in which the performance and economy of the new technology is determined. This is followed by an industrialization phase, and finally the use of the new technology.

Timing - The concept of innovation timing is analyzed. The date of introduction of the innovation and the identity of the innovating firm are essential in the theories of innovation economics. The upheavals in the industrial economy and the tools for analyzing investment strategies help explain the evolution of the study of innovation timing.

Trajectory - The definition of the concepts of paradigms and technological trajectories is proposed. Then the trajectory is studied in the context of the evolution of the company. A reflection follows, both on the role of dynamic capacities and knowledge capital in the formation of trajectories and on the consequences of their collective formation.

User - The main motivations pushing users to develop innovation by their own are analyzed. Then, the main approaches by which users are integrated in the

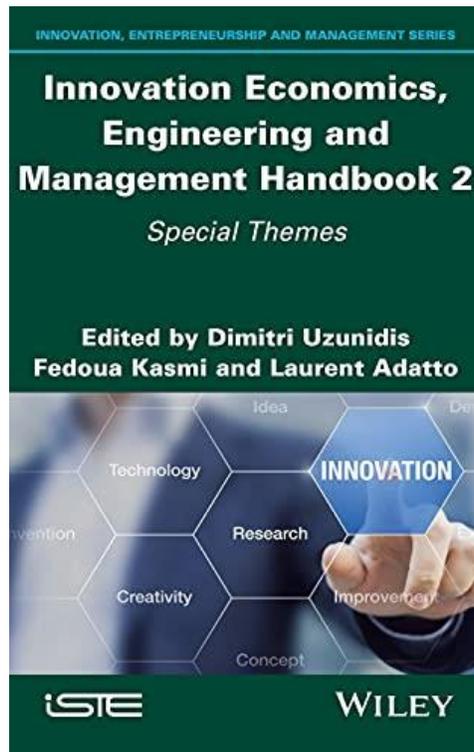
innovation processes of firms are reported. The symbiosis between user innovation and paradigm innovation is also illustrated.

Value - The source and specificity of the value of innovations is discussed while looking at the methods for assessing their private and social value.

Work - The concept of innovative behavior at work by an employee is put forward. It is a behavior desired by organizations, but neither systematically required, nor necessarily recognized. In this sense, it is an extra-role behavior, beyond the prescribed role.

X-Innovation - The first volume ends with a glossary of terms associated with technical innovation under the term X-innovation. This multiplication is justified by the broad appropriation of innovation in various fields. The glossary addresses the following types of innovation: Agile innovation, Digital innovation, Dual innovation, Environmental innovation (or Eco-innovation), Frugal innovation (and Jugaad), Reverse innovation, Managerial innovation, Minor (or Incremental) innovation, Open innovation, Participatory innovation, Radical (and Disruptive) innovation, Responsible innovation, Social innovation, Strategic innovation, Systemic innovation.

VOLUME 2 – SPECIAL THEMES



Meaning - Including in the second volume of the handbook, a new approach of innovation, «Thinking the Meaning of Innovation», goes over the designation of a single solution to identify a set of potential answers from multiple fields. It constitutes an important reshaping in the field of innovation studies, building on

both conceptual and operative analyses.

Engineering - The sector of innovation engineering is also explored, from a detailed practical way in the French context. In particular, the risks of innovation engineering are explained, and practitioners can use these pieces of advice to optimize their actions.

Absorption - The absorptive process of knowledge related to its impact on innovation is updated with new forms and variety of facets.

Big Data - Innovation studies are extended with a prospective of key IT sectors that include big data and artificial intelligence.

Blockchain - Blockchain is also analyzed in relation with innovative co-creation processes.

Bricolage - The concept of «bricolage», also known as DIY (Do It Yourself) – combining practices of creation, repairing and re-purposing, generally without marketing goal, neither automatized processes, and with a large part of improvisation – is studied for its high potential of creativity and practices to develop innovation studies, in particular related to frugal innovation.

Circularity - The correlations between circular economy and innovation studies are also implemented in the handbook.

Co-creation - The different facets of co-creation are differentiated to be able to show their potential of symbiosis regarding to innovation studies.

Community - The notion of communities of practices is developed in all its complexity, that includes connection and harmony between community members, methods of community co-development, virtualized community ground, and how innovation processes benefit from communities of practices.

Craftsman - Also related to the second volume, the field of crafts is analyzed in accordance with the key role of the figure of the craftsman with the aim of integrating concerned specifications to innovation studies. Beyond the ancient industrial era and its countless reshaping, the affiliation of the craftsman's methods supply, building on elements of tradition and dynamism of modernity, is an important asset for innovation studies. In particular, to be able to get beyond from imperatives of high cost patenting, and to produce continuous innovation with spontaneous and assembly dynamics.

Defense - Are also emphasized innovation processes in the military sector for the dual use of developed technologies. Military innovation processes study allows to distinguish the matrices of knowledge intensive output, high tech driven contribution, and consideration of demand.

Design Thinking - Furthermore, design thinking as a pragmatic way to develop products, services and experiences for consumers, is methodologically analyzed, from the origin and evolution of the field to its role in innovation management. Its steps are exposed: discovering needs of customers, generating and developing related ideas with the contribution of the stakeholders, testing shaped ideas with a large range of methods and devices, allowing to boost related innovation management.

Digital - In harmony with the advent of the digital era, IT entrepreneurship is analyzed in concordance with innovation studies. In a prospective way, innovators

must be in sync with digital sectors that include artificial intelligence, cybersecurity, cryptocurrencies, internet of things, blockchain and quantum technologies. Most future related innovations will be highly disruptive and involve to be part of these sectors and catch the opportunities for the IT entrepreneurs, and beyond. For that purpose, the dynamics of IT entrepreneurship are clearly refined. The innovative successful companies of the domain and their related categories are analyzed, from start-ups to GAFAM. The exposition of the variety of entrepreneurial IT ventures is also crucial to be aware of the innovative opportunities of the sector. A dedicated part of the analysis covers digital entrepreneurship in the field of innovation studies and aims to extend the knowledge of the domain. IT entrepreneurial processes, stakeholders, ecosystem strategies, platform policies are parts of the analysis. The full pieces of explanation allow to give a detailed image of digital entrepreneurship related to their innovative dynamics.

Entrepreneurship - Social entrepreneurship is also analyzed in an innovation studies approach. Social entrepreneurship aims to go over traditional entrepreneurship to integrate values beyond commercial only imperatives. In particular, social parts can be related to environmental sustainability and commons.

Fintech - The second volume also plainly considers Fintech, as the new symbiotic cross sector that combines finance and technology. Fintech prospective is crucial because of the parallel with the permanent progress of computing technologies they are linked with. The potential of disruptive and sustaining innovations related to the fintech sector are exposed. The progress of IT support in finance is analyzed, in particular in a historical and evolutionary approach.

Gerontech - Also developed in the second volume, the sector of the aging support. The silver economy is analyzed considering the «gerontech» dynamics of innovation. A relevant and key research question is formulated to bring an important knowledge about aging being a driving force of innovation and silver economy an important new domain of economy that can have a key impact on economic growth. A state-of-the-art of the gerontech is produced. All of these analyses allow to generate a relevant approach related to the new terminology of «geront'innovations» that considers concerned innovations in a full way: technological, including internet of things, robotics, computer-aided surgery, assistance and security systems, bionics possibly related to implants and nanotechnologies, and beyond.

Greentech - Innovation vectors for environmental transition are also studied, including renewable and non-carbonated energies, and innovative CO2 capture devices. Innovations on nanotechnologies, especially concerning healthcare are shown. Transitional industrial innovations are analyzed, including recycling of metals,

textiles and glass. Innovative green reconfiguration of technological and societal systems are explained for their symbiotic dynamics.

Hacker - Also part of the second volume, the modern meaning of the term «hacker» is analyzed, in particular the way how hacker culture spread and influenced the society in relation with its impact on innovation, including with the free software / open source movement, and the emancipation of «innovative consumers».

Health - Particularly boosted by the pandemic, health innovations, including telemedicine, are studied. Progress of IT tools that allow the development of telemedicine are emphasized. **Intellectual Corpus** - Knowledge-based innovation is analyzed in an industrial context. In particular, the way industrial creatives ideas can be transformed in knowledge. For that purpose, the key concept of innovation studies, KBI (Knowledge-Based Innovation), is refined regarding with the last state-of-the-art, and the emerging ICAROS model is explained for its potential impact on industry.

Imagination - A dedicated study of the second volume shows that Science Fiction, anticipation literature and imagination have a crucial impact on the shaping of radical innovation. Are analyzed that Sci Fi always been a source of inspiration for space agencies and firms, and that related novels led to the diffusion of storytelling, especially on the young engineers' minds that became innovators in their career.

Marketing - Cooperation between academics and industrial agents in the domain of innovation marketing is precisely studied.

Milieu - It is also shown that territorial development has a major impact on the knowledge creation and innovative processes. That leads to stimulate the economic growth at all the potential scales, from local to regional ones. For that issue, the concept of innovative milieu is refined. In particular, its networking potential is emphasized. The full analysis, enriched with the study of the European Research Group on Innovative milieu (GREMI, from its French name – Groupe de Recherche Européen sur les Milieux Innovateurs), is an essential contribution for innovation studies.

Nanotech - The booming industry of nanotechnologies is historically analyzed allowing to present their most updated and prevision innovative applications.

Novelty - The impact of creativity on innovation and novelty is also largely studied.

Open - The open paradigm is analyzed, in particular for its contribution to innovation studies. It includes open data and open source software and hardware. The historicity of the open movement allows to understand the filiation and common dynamics of the sectors. In relation, the concepts of commons and digital commons

are explained in sync with the perspective of Elinor Ostrom.

Personality - The singularities of the innovator figure, building on a clear definition of innovation, are characterized. For that purpose, the functions of the various stakeholders of the innovation process are analyzed. The central role of the innovator in this process is shown. The personality and the social function of the innovator are emphasized, as his understanding of the market economy from the historical Schumpeterian perspective to the last evolutions. In that perspective, a study of the deviant personality of the innovator is shaped as an asset of innovation studies.

Real Estate - Also integrated to the second volume, the processes of innovation in relation with the real estate sector are established, including financial and human resources implications. The innovative practices of the real estate are shown and related with the stakeholders that include developers, brokers, property and asset managers.

Skills - The singular entrepreneurial skills contextual to innovation are analyzed. They include creativity, self-efficacy, enthusiasm, empathy, curiosity, brokering, risk propensity and leadership. Competencies, resources and dynamics of ideas are also emphasized.

Small Business - The characteristics of the small business companies related with innovation are shown. The importance of outside knowledge and of public support are analyzed in that perspective.

Spin-off - The role of the spin-off innovation related to universities is studied. The evolution of the R&D spin-offs and the perspectives of the phenomenon are established.

Start-up - Start-ups, venture capital and related financial cycle are also studied in an innovation study approach.

Territory - The innovative services related to territorial dynamics are analyzed. For that purpose, the singular innovation processes in the sector of services are fully characterized. The knowledge-intensive business services (KIBS) is used for the understanding of the innovations characteristic in the service sector. The geography of innovation related to highly intensive business services is also done in a relevant way with KIBS. The key role of public support to boost territorial dynamics is shown.

Well-being - Finally, the notion of well-being is analyzed regarding to its impact on innovation. In line, the Schumpeterian creative destruction is interpreted for its role on well-being. That development constitutes another asset for innovation studies because it largely extends the few previously done.

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Innovation Economics, Engineering and Management Handbook 1 is the first of the two volumes that comprise this book. The main objectives across both volumes are to study the innovation processes in today's information and knowledge society; to analyze how links between research and business have intensified; and to discuss the methods by which innovation emerges and is managed by firms, not only from a local perspective but also a global one.

The studies presented in these two volumes contribute toward an understanding of the systemic nature of innovations and enable reflection on their potential applications, in order to think about the meaning of growth and prosperity.

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