



”How and Where the R&D Takes Place in Creative Industries? Digital Investment Strategies of the Book Publishing Sector”

Pierre-Jean Benghozi, Elisa Salvador

► To cite this version:

Pierre-Jean Benghozi, Elisa Salvador. ”How and Where the R&D Takes Place in Creative Industries? Digital Investment Strategies of the Book Publishing Sector”. *Technology Analysis&Strategic Management*, 2016, 28 (5), pp.568 - 582. hal-02078881

HAL Id: hal-02078881

<https://hal.science/hal-02078881>

Submitted on 25 Mar 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

This article has been accepted for publication by *Technology Analysis&Strategic Management*

It can be cited as follows:

Benghozi P.-J., Salvador E. (2016) "How and where the R&D takes place in creative industries? Digital investment strategies of the book publishing sector", *Technology Analysis&Strategic Management*, vol. 28, n. 5, pp. 568-582.

“How and Where the R&D Takes Place in Creative Industries? Digital Investment Strategies of the Book Publishing Sector”

****Benghozi P.-J., **Salvador E.***

Abstract: The innovative and strategic models of creative industries (CIs) in the digital economy are capturing an increasing interest in recent years. Yet, most of the literature deals with creation and talent and very little with technological and innovation perspectives. Innovation is in general considered from a single viewpoint: a means to develop new creative contents. This paper investigates an important issue surprisingly neglected in scientific literature and public reports: the topic of R&D and technological innovations in CIs. The paper characterizes how and where R&D takes place in the book publishing industry. A systematic identification of R&D developments concerning e-book technology has been achieved using an original methodology set up to feature the technological strategic evolutions. The results provide a reliable cartography of the value chain through an adaptation of the OSI layers model. This framework helps to understand the new digital ecosystem of the book publishing sector and the strategies carried out by the editorial houses.

Keywords: creative industries; publishing industries; R&D; value chain; e-book

***Pr. Benghozi Pierre-Jean:** Research Director CNRS, and Professor at the Ecole Polytechnique, Paris, France, e-mail: pierre-jean.benghozi@polytechnique.edu

****Dr. Salvador Elisa:** Researcher, Ecole Polytechnique, Paris, France.

Adjunct Professor at Iéseg School of Management, Paris campus, Socle de la Grande Arche - 1 Parvis de la Défense, F - 92044 Paris La Défense cedex.

Address: Management Research Center, I3-CRG, Ecole Polytechnique, CNRS, Université Paris Saclay, Bt Ensta 828, Boulevard des Maréchaux 91762 Palaiseau Cedex, France, *corresponding author*, e-mail: elisa.salvador@polytechnique.edu ; e.salvador@ieseg.fr

Acknowledgements: This research has been carried out thanks to the financial support of the Centre National du Livre (CNL), Paris.

Preliminary versions have been presented at the XII International Conference on Arts&Cultural Management (AIMAC), 26-29 June 2013, Universidad de los Andes, Bogotá (Colombia), at the XI International Conference TripleHelix, 8-10 July 2013, Birkbeck and UCL, London and at the XXIV International Conference on Strategic Management (AIMS), 3-5 June 2015, Dauphine University, Paris.

Introduction

Creative industries (CIs) trigger an increasing interest in recent years (UNCTAD, 2010). Starting from the initiatives taking place in the UK (DCMS, 1998), many studies investigated their unique contribution to economic growth and organizational design. The literature originally focused on the role of the creative class and the management of talents (Scott, 2006; Florida, 2002; Caves, 2000). The interest is nowadays focused on networks, CIs clusters and creative cities (Lazzeretti, 2013; UNCTAD, 2010; Crossick, 2006) seen as regional development strategies. Lastly, research focused specifically on the innovative dimensions of CIs and their business models (Benghozi, Lyubareva, 2014; Parkman et al., 2012; Benghozi, Paris, 2007; Throsby, 2001; Howkins, 2001). Lazzeretti et al. (2015) even developed a systematic bibliometric analysis of the flows of knowledge, interactions and theoretical origins, demonstrating how the creative economy research is really a multidisciplinary paradigm born from four knowledge pillars: creative class, creative city, cultural and CIs, creative clusters. According to these authors, this strand of research contributed to the rise of the creative sector as a new research field.

The Internet diffusion fostered the development of a knowledge and innovative economy that assigns all its importance to “creative” processes and information systems (Cohendet, Simon, 2007). In this evolution, the CIs are a pioneer and turn to be an ever-increasing inspiration for traditional industries (Lampel *et al.*, 2000): the economic model and the particular organisation of the sectors, the intangible and cognitive creative components, the growing importance in the digital market, the new business models and value chain structuring are just some representative aspects.

As a consequence, scientific literature¹, special issues of academic journals² as well as public reports³ are increasing.

Their contents are usually very wide-ranging. R&D and technological innovations are neglected words and essentially considered as a means to develop new creative contents: talents and employment implications for innovation processes, CIs businesses' innovation contribution, open innovation in CIs. Despite numerous editorial initiatives (see note 2), scarce specific investigations focused on addressing the specific question of “technological innovation in CIs” with few exceptions⁴. The very recent special section of *Technological Forecasting & Social Change* highlighted that ICTs are a pivotal driving force for CIs (Sung, 2015); it also focused on how to promote and finance technological innovation underlining that policies aiming at promoting innovation in CIs are linked to positive and negative implications (Bae, Yoo, 2015). Nonetheless, notwithstanding this recent attention to innovation aspects, the very important issue of R&D in CIs (Brandellero, Kloosterman, 2010; Green *et al.*, 2007), continues to be neglected. This is surprising because R&D is unanimously regarded as the main source of growth and performance in competitive and highly changing environments (cf. Freeman, 1974; Lundvall, 1992, Aghion *et al.*, 2009). As highlighted by Barge-Gil *et al.* (2011), firms can survive only if they continuously “upgrade their

¹ e.g. for the qualitative ones: Flew, Cunningham, 2010; Harper, 2011; Hotho, Champion, 2011; Jaw *et al.*, 2012; Benhamou, 2015; Bhatiasevi, Dutot, 2014; for the quantitative ones: Muller *et al.*, 2009; Bettiol, Sedita, 2011; Chaston, Sadler-Smith, 2012; Parkman *et al.*, 2012; Bohnenkamp *et al.*, 2015.

² cf. *Industry & Innovation*, 2008, special issue: Managing Situated Creativity in Cultural Industries; *International Journal of Cultural Policy*, 2009, special issue: After the Creative Industries; *Innovation: Management, Policy and Practice*, 2009, special issue: Innovation Policy in the Creative Industries; *Organization Studies*, 2012, special issue: Misfits, Mavericks and Mainstreams: Drivers of Innovation in Creative Industries; *Technological Forecasting and Social Change*, special section: Digital Technology and the Creative Industries: Disassembly and Reassembly, 2014; *International Journal of Arts Management*, special issue: Financing Creativity: New Issues and New Approaches, 2014; *Technological Forecasting and Social Change*, special section: The Creative Economy in Global Competition, 2015.

³ e.g. Foundation for Research, Science and Technology, 2003; KEA, 2006; Davy, 2007; Santagata 2009; UNCTAD 2010; HKU, 2010; SGS, 2013; CBI, 2014; Roxane, 2014.

⁴ Cf. in particular, the Special Issue “Innovation Policy in the Creative Industries” (*Innovation: Management, Policy and Practice*, 2009).

technologies”, especially in the digital age. The few existing studies underline the “impact” of technology - especially the digital one - on CIs sectors and its “appropriation” by the companies. Nonetheless, beyond the *appropriation phase*, “how” CIs actors take part in “elaborating and developing” technological innovations has not yet been investigated. The *development phase* is particularly important since it shapes, designs and determines the structure of further uses. Moreover, it calls for specific skills and knowledge development whereas several hypotheses exist about the supposed lack of competences of CIs actors in order to invest in intensive technologies.

We assume that the general absence of investigations on R&D activities in CIs in general is due to a “*biased*” vision of the real relevance of these assets for creative companies. What does the concept “R&D” really means for creative firms? Actually, innovations can occur in firms that do not perform formal R&D or they are not counted as the result of formal R&D (Barge-Gil et al., 2011; Nelson, 2000). This is even true in the specific case of CIs because, as a matter of fact, creative firms conceive new products as the development of innovative contents and never consider them as the output of technological R&D activities⁵. When R&D activities are carried out by creative companies (e.g. throughout projects development) they are hardly defined formally as effective R&D activities. This has been confirmed by Potts (2009, p. 141) who stated that “*activity which might otherwise be classified as R&D is not so classified in these industries*” because it is seen as a normal aspect of business strategic operations. As a consequence, CIs are generally associated with various

⁵ The famous André Malraux, at that time French ministry of culture, characterized in the 60s the film industry as a prototype industry, considering esthetical originality as the main source of inventiveness. Nonetheless, the main disruptive technological innovations in the CIs have always taken place outside these industries. This was the case for sound movie (invented by General Electric in the early XXth), for the disruptive devices like Walkman or CD (created by Philips or Sony before they entered into the media industry), and, more recently, for the MP3 and Appstore in music.

forms of “hidden innovation”⁶, difficult to measure with traditional indicators (Cunningham, 2013; Barge-Gil et al., 2011; Brandellero, Kloosterman, 2010; Miles, Green, 2008; Green *et al.*, 2007).

Within this context, our research perspective aims at understanding where R&D actually takes place in CIs, how the articulation is made with content and development projects, which economic actors are taking charge of it, where they are located in the value chain, and how they are articulated with content producers. In short, to what extent observable innovations reveal the technological strategies of the actors involved in the book sector.

The actual role of technology and R&D in CIs can be drawn through identifying at which steps technical innovations take place by depicting and mapping all the main phases of the R&D value chain in a specific sector. This is the objective of the paper. It focuses on the book publishing sector. On the one hand, it is a well-established and stable industry, based on sunk costs related to heavy investments in technological infrastructure. On the other hand, the editorial projects required only low technical investments and barriers to entry. The digital technologies and e-book revolution transfigured such market structure⁷. The actual context of its technological innovations value chain is poorly known. Nonetheless, new comers like Apple, Amazon and Google with their disruptive innovations are destabilising more and more the book publishing industry. This novelty calls for and justifies deep research investigations in order to understand if investment strategies in hidden innovation are identifiable and deserve to be understood. This means to investigate how content producers can support autonomous strategies in order to face outside technological disruptions. These are the key questions of this article.

⁶ The concept of hidden innovation is deepened and contextualized to the book publishing industry in section 4.2.

⁷ This makes this sector a more suitable case-study compared to other high-tech CIs calling for heavier technological investments like cinema or video-games.

In recent years, the book publishing industry has experienced many ICT-based innovations such as on-line distant sales and the emergence of e-books (Benhamou, 2015; Mangematin *et al.*, 2014; Guiry *et al.*, 2012; Greco, 2011; Howard, 2009; Ronte, 2001). The corresponding strategy of publishers is to appropriate the emerging technologies and innovations rather than to define upstream a controllable ecosystem and technological architecture. Notwithstanding, the digitisation of book publishing has not been deeply analysed till now. As a matter of fact, the digital transformation process of a traditional publishing house has still been scarcely investigated (Oiestad, Bugge, 2014).

Hence, the objective of this paper is to reconstruct the ongoing innovation paths and to characterize the technological R&D ecosystem of this creative sector. It aims to understand in which extent the book publishing CI can implement pivotal strategies to support endogenous technological innovativeness or should develop early external industrial partnerships. To this aim, an original methodology is adopted, meaning the reconstruction of the different phases of the industrial technological value chain through an adaptation of the classical computer science OSI model (Zimmermann, 1980).

The paper is structured as follows. The theoretical framework presents the literature perspective on R&D. The empirical background then focuses on the various value chain levels and their recent evolution. After the description of the methodological framework and its theoretical roots, we present the results of the cartography of the layers in the e-book publishing value chain. Additional insights from face-to-face interviews will complement this description followed by critical discussion of the findings and concluding remarks.

1. Theoretical framework

Over the years, the concept of innovation has profoundly changed in economics and strategic management. It has usually been conceived as the result of an essentially

technological process, originating in basic research and then declining in applied research, development and commercial novelty (cf. Abernathy, Utterback, 1978; Thompson, 1967). It calls to mind what Freeman (1974) defined a 'coupling process' between the market and the technology sectors. Subsequent studies have shown that innovation is also a continuous and cross-cutting approach (Brown, Eisenhardt, 1998; Nonaka, Takeuchi, 1995). As a consequence, it has then been considered as the ability to rethink the overall design of a product/service including its dimension, use, service or business model (cf. Von Hippel, 2007). The digital economy has complicated the context by giving to various radical technologies (e.g. networks, Internet, devices, Appstores) a decisive weight in innovation ecosystems (cf. Yoo *et al.*, 2012). It had a disruptive effect on existing industries and prevailing business models (Oiestad, Bugge, 2014; Benghozi, Lyubareva, 2014).

Thanks to the relevance and nature of R&D (Brockhoff, 2003; Narula, 2001), innovation and technology in firms' organization stimulated therefore a large range of literature: among many others, Lundvall (1992), Christensen (1997), Jacobides, Winter (2007), Aghion *et al.* (2009) and Steinmueller (2010). In the specific context of CIs, a first interesting issue is the general lack of significant investments in R&D of creative companies. One of the reasons explaining these poor investments in R&D may be linked to the general small size, skills and capitalization of CIs (Bhatiasevi, Dutot, 2014) with related difficulties in R&D investments. Notwithstanding, other motivations may explain this deficiency, because also large creative companies are under investing in R&D (Foundation for RST, 2003).

The lack of technical innovation can also be interpreted as a lack of investments in technological knowledge-based resources. Actually, "information technologies play an important role in effectuating the knowledge-based view of the firm" and achieving competitive advantage (Alavi and Leidner, 2001, p. 108).

Another line of reasoning argues that it is difficult to separate the investments in projects from the ones in technologies. Creative firms perceive R&D as something related more to investments in projects and contents rather than directly to technologies, design and innovation on processes, infrastructure and devices. Accordingly, another argument has to be raised: CIs companies are considering that they take already so much commercial and aesthetic risks by creating new content that they cannot take in charge additional technical risks. As a consequence, they are reluctant to invest directly in R&D projects and prefer to adopt experienced technical solutions. This process may originate an involuntary dependence on external innovations (Oiestad, Bugge, 2014) that determine the real sector evolution.

Far from being simply considered in technical terms, it means, in terms of sociology of innovation (Akrich et al., 2002) and of interactionism (Becker, 1982), understanding the development of innovation as the ability to structure and design a network of actors and stakeholders cooperating together on new projects.

In such a perspective, innovation is seen as a normal aspect of business operations and strategy (Potts, 2009). Besides, Jisun (2010) underlined the singularity of innovation patterns in CIs mostly reliant on non-technological “soft” innovation⁸ (Stoneman, 2010).

Notwithstanding these important issues, the existing literature does not provide insights on the various phases of the value chain nor how R&D is effectively carried out in CIs. This is even the case for the rare existing studies (e.g. Cunningham *et al.*, 2004; Foundation for RST, 2003). Few practical and implementable solutions emerge, including in the EU⁹ or extra

⁸ Stoneman (2010, pp. 23-24) focused extensively on innovation in CIs and “product aesthetics”: he defined soft innovation as “the introduction of any new aesthetic product or product variant [*or*] aesthetic innovations in industries the output of which is not aesthetic per se but functional”.

⁹ Cf. Australia, SGS, 2013, Canada, Davy, 2007; New Zealand, Foundation for RST, 2003; the UK, CBI, 2014, Green *et al.*, 2007; France, PIPAME, 2012; Austria, Muller *et al.*, 2009; France and Europe, Roxane, 2014.

EU latest studies¹⁰. This situation is exactly reflected in the book publishing sector: it aroused the attention of both the scientific literature and the public reports with similar perspectives focusing on economic evolution rather than technological strategy.

The analysis of the CIs value chain is one of the reliable means to analyse the structure and function of CIs (Bhatiasavi and Dutot, 2014): yet it most often comes down to the basic categorization into creation, production, distribution, retail and consumption (UNCTAD, 2010). No specific investigations really aimed at mapping the technology developments and the R&D role in the *specific* phases of the value chain of a single CI.

2. Methodology

Our research is supported by a multidimensional and special methodology specifically designed and contrived by the authors to extensively characterize and trace the various innovations and technological paths. First of all, the extensive mapping of the R&D ecosystem of the book publishing industry has been elaborated through a methodical codification of the technological developments that are detectable in the recent history of the industry. To that end, we tracked all the existing technical documents and implemented a systematic exploration of the related content. We carried out a codification process that aimed at identifying the categories of innovation being developed and their specific nature, and at setting the R&D development value chain as well as the economic actors supporting it (internal or external to the traditional boundaries of the sector).

We built the cartography starting from an analytical coding of the main characteristics of the e-readers and tablets: we stripped the technical documentation concerned with technological trajectories and public reports about technologies and we explored the different versions of

¹⁰ These reports document and value the size and role of the creative economy at national or local level, they evaluate its pivotal economic contributions through the provision of some statistics on a number of creative sectors, and assess that creativity is essential to workforce investment and economic development strategies.

the most successful devices (Kindle, Kobo and Nook, cf. Miller, 2013) cross-checked with Internet websites of the companies.

Secondly, face-to-face interviews with CEOs and managers of French publishing houses, founders of digital platforms and experts in publishing technologies have complemented the mapping perspective by identifying precise strategies. Table 1a resumes our *modus operandi*.

Table 1a: Sources for data collection

Material and documents	Types	Content (main keywords)
43	Scientific and technical papers	Innovation in CIs; digital publishing; book evolution; electronic book; technology in publishing; R&D; digital media transformation
5	UE reports	Publishing sector; e-books; the EU economy of culture; creative economy; promoting the potential of CIs
2	French reports	Business models of CIs; advertising in cultural industries; CIs in EU reports; management of intangible assets in CIs
9	Other countries (not French) reports and working papers	UK CIs; CIs R&D in New Zealand; CIs R&D in Australia; soft innovation
22	Specialized books	The economy of CIs; the Internet economy; entrepreneurship and CIs; history of book technologies; CIs and innovation; the book publishing industry; economics of (open) innovation and technology policy
20	Face to face interviews	French editorial houses, e-book, business model, value chain, technological investment strategies, digital innovations

The innovative events have been spotted and coded on the basis of: technical identification, date, related economic actors, corresponding technical layer, value chain level, industrial partnerships, associated standards. These events have been then represented graphically according to an original layout (cf. section 3) structured in successive technical

layers. It displays generic technologies, relationship graphs and the actors embedded in the various phases¹¹.

This technological history has been completed by twenty interviews conducted in Paris between January and December 2013, according to a sample selected from the most important French professional directory (Table 1b). The objective was to confirm the key findings of the cartography in progress, to identify possible missing innovations and to capture the main editorial strategies facing the e-book revolution and the competing actors.

Table 1b: Sources for data collection


Interviews	Characteristic of interviewee
7	French publishers
4	Technology professionals
4	Representative actors (i.e. syndicate, associations)
5	Distributors, diffusors, digital libraries

The results of the analysis have been resumed and visualized in a chart structured according to multiple technological levels. Every chart corresponds to a particular technical level and presents three different constituents: 1) the events and/or the actors involved (in bold), 2) the generic technologies (in italics), and 3) the relationship graphs resuming the various interactions (application, implementation or reciprocal relations). We adapted the robust and classical seven structural and technical layers “Open Systems Interconnection” (OSI) reference model traditionally used in computer sciences and Internet economy (Zimmermann, 1980). This model portrays the architecture of the industry assuming a hierarchical vertical division of the technical layers. Each consistent layer is considered to be ruled by technological specificities characterizing technological concerns, investments, skills, industrial companies, economic models and clients’ perspective. It was not possible to use the

¹¹ For instance, the deep analysis of all the main features of the different e-reader versions helped out to identity the precise technologies that influenced the competitive characteristics of these e-readers. The technologies have been investigated in details and catalogued in various groupings. These groups revealed, in particular, how several specific technologies have been introduced for ink and display characteristics development, for light and quality image improvements, for sound property ameliorations and for features of augmented e-books.

original version of the OSI model in its original structure, because it was designed specifically for information technology and telecommunications. Indeed, it overstates certain components of technical layers that were irrelevant for our purposes. Consequently, we slightly adapted the layers originally designed in the telecommunication field, in order to fit with the actual structure of a content industry like the book publishing sector. In particular, the first 3 layers have been redefined through a separation of the device and the infrastructure parts. Additionally, we opted to present levels 2 and 3 jointly for layout matters.

Legend:

- 1) Events and/or actors involved: **bold character**
- 2) Generic technologies: *italics*
- 3) Arrows: boxes  describing the kind of relationship (application, development, reciprocal relation)

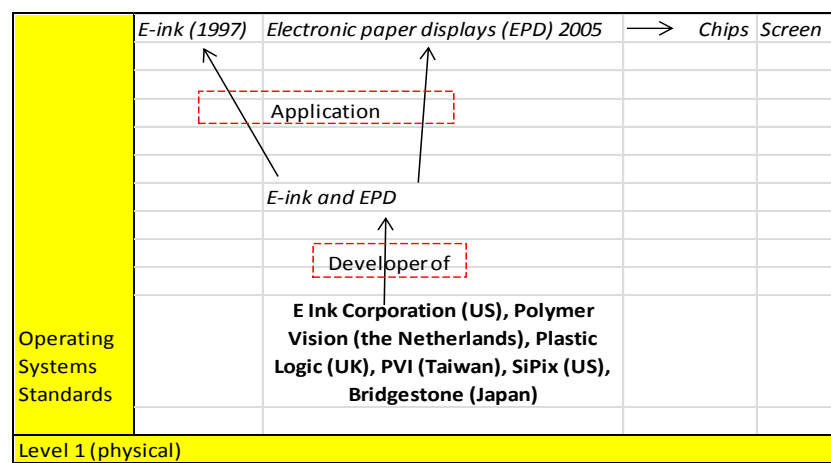
3. Results: the cartography of the e-book publishing value chain: focus on the layers and the interview results

In the OSI model, Level 1 focuses on the *operating systems standards*. One of the corresponding starting points in the book publishing sector has been the introduction of e-ink technology and electronic paper displays (EPD) at the end of the '90s. These technologies are related to Levels 2 and 3 that are focused on the *hardware and technology of terminals*: e-ink technology influenced digital printing and the innovative display supporting the emergence of the first tablets, e-book readers and personal digital assistants (PDAs). Several formats succeeded one after the other until the prominence at the international level of e-pub and pdf formats. Recent improvements are identifiable in the attempt at creating augmented books with additional properties like optical reader-embedded pen and audio-books. Level 4 is focused on *standards and software*: blogs and social networks like Facebook and Twitter, and the diffusion of publishers' platforms, consortia and partnerships that are impacting the infrastructures and networks linked to the connection to consumers (*Architecture of infrastructures and networks*, Level 5). Printing on demand (POD), digital aggregators, digital

libraries, distribution platforms, are some key examples. In this context, Level 6 (*Middleware*) is focused on the tools structuring economic relations and exploitation rights. In particular, it includes those against piracy like digital rights management (DRM). Finally, Level 7, dedicated to *user interfaces*, identifies the main ongoing developments like 3D e-books and green IT (environmental consequences of toxic substances for e-readers production).

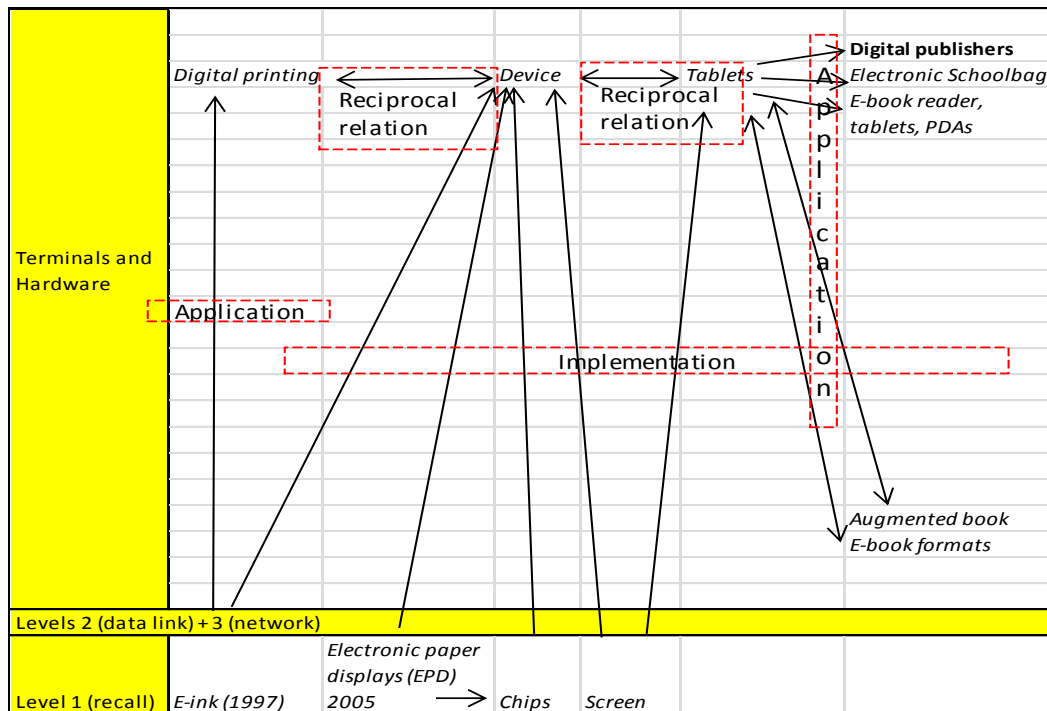
The various OSI levels are presented in details as follows.

Level 1: Operating systems standards: the key role of e-ink and EPD technologies



Looking at the elements structuring the operational system of e-books, it is interesting to underscore that the initial technology supporting the e-book development was the electronic ink (e-ink) rather than the terminal itself or its processor. This electrophoretic driven-technology is a direct extension of the paper model, ensuring a comfortable reading, including in sunlight, but also reducing energy issues or weight (Leal, 2009).

Levels 2 and 3: Terminals and hardware: the competition between tablets, e-readers and PDAs



One of the significant dimensions of the technology rivalry at Levels 2 and 3 is related to the competing devices used to read e-books¹².

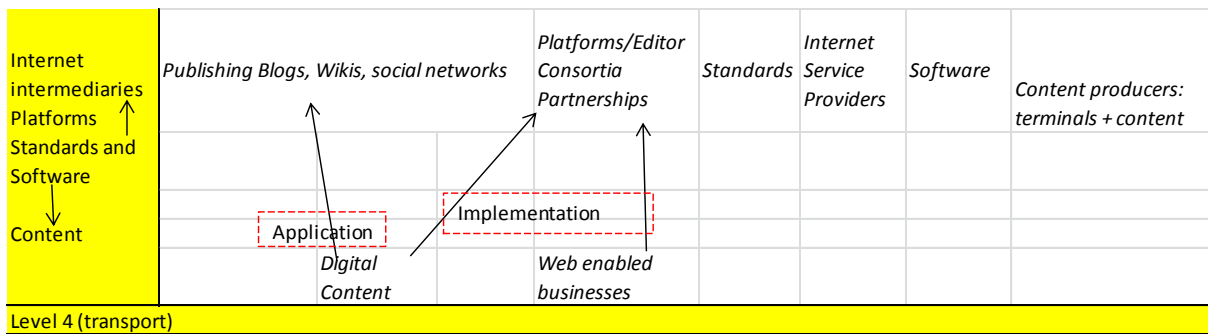
From 2006 to 2010 several new e-reader devices entered the market, most of them using the e-ink technology¹³. Other improvements may also be found in sound quality and voice synthesis technologies for facilitating audio books creation. We are also assisting to the emergence of book-apps providing enriched information and contents. It is worth to underline that despite their various designs and services, the different e-book readers share similar core technological characteristics. Nonetheless, there is still no single e-book publishing standard readable by all the devices of e-readers (Miller, 2013). This is a result as well as the consequence of the technological strategies implemented by physical booksellers and

¹² A representative list of examples of e-readers and tablets is provided in the Annex.

¹³ The attention towards e-books and digital reading increased conspicuously when Sony released its e-reader Librie in 2006 in the US market and Amazon launched the Kindle e-reader with its online sales mechanism in 2007, followed by Barnes and Noble with its Nook e-reader in 2009.

publishers, meaning the establishment of industrial partnerships on yet developed devices (cf. Kindle and Kobo for Barnes & Noble in the US and Fnac in France, for instance).

Level 4: Standards and software: the intermediary role of blogs, social networks, platforms, consortia and partnerships among publishers

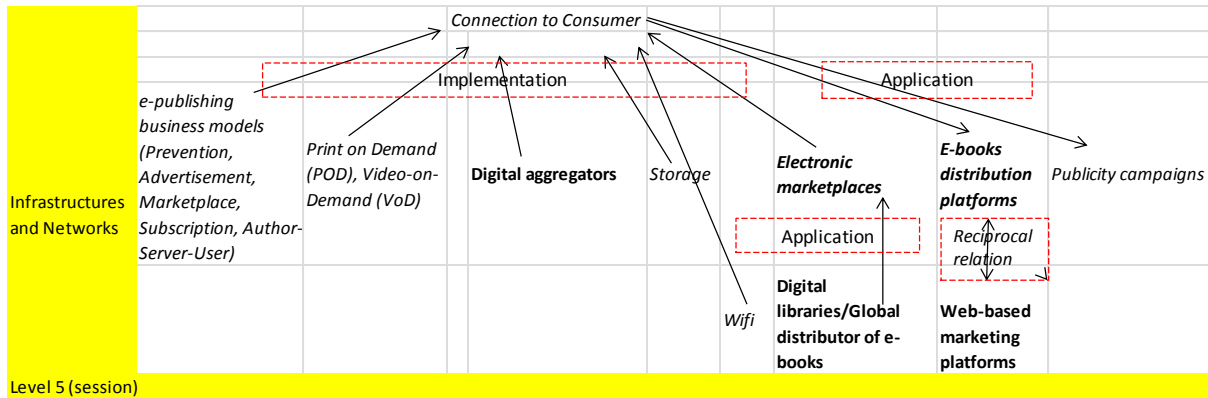


In level 4, newcomers - often (large) ICT platforms like Amazon - are setting the scene and reinventing the traditional business models. The innovations resulted in a shift of power towards downstream distribution activities through important process innovations: Amazon uses data-mining systems to enhance the quality of its suggestions, compile users' choices and recommendations to develop advertisement.

Collaborations take place with Facebook and game developers to create fresh new contents and services¹⁴. Major digital book platforms have been launched and the latest e-readers and tablets are offering links with the main social networks.

¹⁴ The social media interest in the book publishing sector is exemplified by the Facebook's purchase of book app developer Push Pop Press and the partnership with Kobo and Netflix (Guiry *et al.*, 2012).

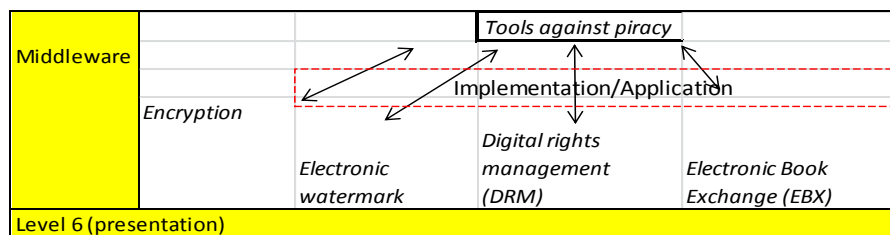
Level 5: Infrastructures and networks: the role played by connection to consumers



At the online distribution level publishers were most technologically active in endeavouring to develop their own platform (Lebert, 2009). Later, new on-line bookstores were created for selling only e-books: the control of these platforms turns to be a competitive resource in order to keep the relations with customers but it also calls for joining together heavy investments and distinctive skills.

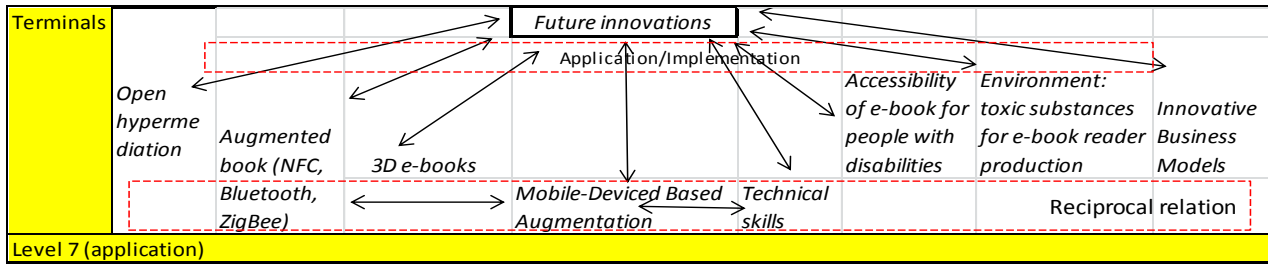
Furthermore, connection to consumers benefits from the introduction of printing-on-demand (POD). From technological commodities, books became micro-technological innovations, meaning the result of wholesale mechanization of printing (Howard, 2009).

Level 6: Middleware: economic structuring and piracy concerns



Piracy is one of the main problems faced by the digital revolution (De Prato, Simon, 2014) and therefore turns to be a key issue at Level 6. Tools like encryption, electronic watermark and digital rights management (DRM), are helping publishers to find a suitable solution (Carreiro, 2010).

Level 7: Terminals and users: technical interface and ergonomy



The seventh layer is mainly compelled to the structuring of users' interfaces. An interesting activity in progress is e-book accessibility to people with print disabilities: features like the translation of the visual digital text of an e-book into voice-audio mode increases accessibility to persons with disabilities (OECD, 2012). Technical competence gaps can still be an obstacle for individuals willing to access e-books and in particular enhanced e-books with apps and richer features.

4. Critical findings: discussion

The e-book technological paths portray an undetermined model of development. E-books contribute to design a new digital ecosystem calling for huge and unused investments of publishing houses in order to support the appropriation of new technical skills, to outline support interoperability between various devices and standards, to build specialized software expertise to publish e-books, and to learn new methods of digital marketing adapted to the new distribution channels. R&D and innovation are leading this evolutionary process. Our original cartography demonstrates that each technical layer is supporting specific strategic perspectives. As a consequence, publishers have even more difficulty in perceiving the evolution of their environment and designing alternative options.

4.1 Where R&D takes place in the book publishing sector? Some reflections arising from the cartography and the interview results

The e-ink's technology (*Level 1*) revolutionized the e-readers world. They became lighter, more compact, and easier to read with increased and/or more displayed screen sizes. They also improved the battery life and the capacity to hold more and more information with expandable memory (*Levels 2-3*). But, in recent years the e-readers have followed one another and the market is still open: a reference and standard model of digital reading support does not exist.

In this context, publishers are investing on skills development: the publishers interviewed highlighted the role of specific trainings attended by internal staff. Technological competences can be, alternately, supported by emerging platforms (*Level 4*), established in the form of a consortium among several publishers or managed by external actors playing the role of intermediaries: this was confirmed by the interviews of distributors and diffusors.

Nonetheless, editorial houses are following the market needs without playing an effective role of leaders. Our interviews confirm that publishers are, for the most part, using the new platforms for distributing books through the Internet; they are also clients of societies that offer assistance in building standard formats like e-pub (*Levels 2-3*), they adopt tools like DRM or electronic watermark, but they are aware of the lack of strong support of tools structuring economic relations and exploitation rights and in particular those against piracy (*Level 6*). At the end of the day, imitation rather than emulation process takes place among publishers (Hannan, Freeman, 1984; DiMaggio, Powell, 1983). One reason is the heterogeneity of techniques and supply of e-readers, tablets and PDAs (*Levels 2-3*): a French publisher argued that this heterogeneity is a “*nightmare*” and publishers do not know which way to go for not losing market power. Indeed, publishers pay attention to be present

everywhere and visible in all technological formats and platforms, as was the case with the printed book.

Investments in R&D and innovation are thus not linked to the creation of a real business model, but mostly to visibility, to maintain the secular place and role of publishers rather than to update their role and functions to the emerging and instable environment. This raises questions about sustainability of this fragile temporary system. The incumbents do not seem to grasp and have the willingness to take the leadership of the actual dynamics of the R&D and innovation evolutionary process. As a matter of fact, one of the key points resulting from the interviews is linked to technological standards (*Levels 2-3*): e-pub and pdf formats have not been a “*choice*,” but an “*imposition*” at the international level. This is a significant concern for a sector that has grown from low to intensive technology. In the digital based sectors technology shapes the strategies of economic actors and gives its full importance to standards. They are not depending on publishers but they have established themselves internationally, through consortia and dominant firms (cf. EPUB3).

In order to maintain their secular place in the digital market, publishers focus, consequently, on “*trust*” building in the relationship with distributors (*Level 5*). The latter are playing a key role for the visibility of the catalogue on all the main digital bookshops. They also try to be present in the emerging specialised platforms as well as in the blogs and links with social networks (*Level 4*)¹⁵.

The relationship between publishers and Internet advertising for books (*Level 5*) is another key confirmation of our assumptions. The interviews highlighted that publishers are

¹⁵ It is interesting to highlight the emergence of a new strategy of building relationships with consumers-readers: the way of buying books is now personalised and readers are followed *after* having bought a book through their active involvement and interactions on the social networks. Digital bookshops, publishing-related community blogs, social media and social networking sites are emerging as key tools for attracting new clients and fostering the diffusion of e-books (Carreiro, 2010; Tian, Martin, 2010).

aware of the importance of the Internet in terms of promotion activities and marketing, but they use this tool only for experimenting marginal initiatives.

On the contrary, a main problem is raised by the emerging role of dominant actors like Amazon and Fnac (*Level 5*): the combination of hardware sales and content delivery. While publishers still argue that suggestions coming from the experience of a physical bookseller cannot be replaced by the algorithmic prescription, there is also a general concern that publishers are losing control of their business to giants from outside the industry, like Amazon, Apple and Google (Miller, 2013; Guiry *et al.*, 2012).

4.2 The actual publishers' strategy

The book sector is subject to variable evolution rhythms. The printed book benefited from the stability of a secular model, while the e-book has not yet a reference model. From a simple downloadable document supported by a shared infrastructure the e-book led to a specific (proprietary) ecosystem. Such technological evolutions are concerning software as well as hardware. In particular, the evolution of e-readers supported autonomous competing legacy systems combined with incremental innovations enriching services and reading functions.

Facing the unlimited possibilities of ICT based innovations, the book publishing industry is characterized by the willingness to retain a position of control regarding the rates of technological change, as recently highlighted by Oiestad and Bugge (2014).

Consequently, the impact of ICT may be defined as “hidden”¹⁶: innovation depends more and more on technologies and standards that are “external” to these industries.

¹⁶ Elaborated by Green *et al.* (2007) and by Miles and Green (2008), the concept of hidden innovation (not-R&D-based innovations) clearly accounts for this perspective. It refers to the fact that a significant group of firms develops innovations spontaneously and with creativity, without performing formal R&D activities: for example, Barge-Gil *et al.* (2011) explored the role played by non-R&D activities that can, anyway, lead to innovation, meaning technology forecasting, design, use of advanced technologies and training. They found that non-R&D activities are critical factors in explaining a company's product and process innovations.

Accordingly, the actors in the CIs' sectors have to involve themselves into wider existing business ecosystems in order to survive and grow and to keep their editorial autonomy and economic influence.

Our main result supports the idea that innovation in CIs is hidden but in a quite specific meaning. While Cunningham (2013), Barge-Gil et al. (2011), Brandellero and Kloosterman (2010), Miles and Green (2008) or Green *et al.*, (2007) argue that innovation is hidden because it is incorporated in creative contents, we add that innovation is hidden, furthermore, because the technological developments in CIs are, as a matter of fact, concealed and covered. Insiders never consider about investing in R&D in order to develop new technology. They rather think over adopting and adapting themselves to technological innovations developed elsewhere.

The book publishing sector has always been characterized by incremental innovations arising from large competing publishers. The e-book introduction represents instead a radical innovation. It generates consequently the defensive strategy of editorial houses mobilizing huge investments to develop innovations (POD for instance) aiming at refurbish the traditional printed book model. While the e-book benefits more new comers like Amazon, Apple and Google, the printed book was seen as a key source of differentiation and the only means to control the digital evolution. In such a situation, the absence of effective competencies and technological expertise turns to be a critical point for publishers: Oiestad and Bugge (2014) argued that on the one hand, they are developing interoperable digital infrastructures, standards and joint distribution systems; on the other hand, they are waiting for a common dominant design to emerge and are moving slowly towards the new digital ecosystem.

These different perspectives confirm our basic assumption that the technological strategies not only improved performance and productivity, as happens usually in traditional industries, but redefined completely the market designs, the business models, the boundaries and the book industry.

The technological *development phase* is as important as the *appropriation phase* most often emphasized in the literature. CIs actors' implication in technologies may be sustainable through the insertion in a specific ecosystem or the development of strategic partnerships with manufacturers of equipment and software through a division of roles.

5. Conclusions

The e-book diffusion fostered publishers to an increased attention towards appropriateness of R&D and technological innovation. They are focusing on some particular aspects and, therefore, could not be able to adopt a global reactive strategy against competitors and incomers.

In conclusion, the actual main problem is linked to concealed innovation in the publishing sector: absence of investments in technological development focused on an “effective” business model. Publishers are adapting their editorial strategy to the succeeding new digital demand needs and the emerging new technological devices, but they are not leading this evolving process with a convincing strategy. In this context, the emergence of devices (readers, e-books, I-Phone) and modes of dematerialized diffusion provide interesting examples of the way the economy of CIs is disrupted by R&D coming from more technical sectors. The price war and technological rivalry among publishers is led by different mechanisms and economic objectives: increase in revenues and market share for the former, creation of dominant terminals in order to benefit from networks and to impose a standard for the latter.

New players emerge and offer unprecedented solutions for aggregating and distributing content, designing original terms of marketing and transaction adapted to this new framework. Therefore, the weight of the technology is also the weight of intermediaries (Benghozi et al., 2015) and economic actors supporting and supported by these technologies: Google, Amazon, Apple are representative examples.

The ICTs revolution calls therefore for a prompt and effective response at the regulatory level. It turns actually necessary to specify the new role of cultural policy makers (Eltham, 2009). Facing the e-book revolution, governments should be fostered to think and develop their action from an industrial reasoning and not just from a cultural objective or dissemination perspective.

References

- Abernathy W. J., Utterback, J. M. (1978), "Patterns of industrial innovation" *Technology Review*, vol. 80, n. 7, pp. 40-47.
- Aghion P., David P. A., Foray D. (2009), Science, technology and innovation for economic growth: Linking policy research and practice in 'STIG Systems', *Research Policy*, 38(4): 681-693.
- Akrich M., Callon M., Latour B.. (2002), The Key To Success In Innovation Part I: The Art of Interesement – Part II: The Art of Choosing Good Spokespersons, *International Journal of Innovation Management*, Vol. 6, No. 2 (June 2002) pp. 187–225.
- Alavi M., Leidner D. E. (2001), "Review: knowledge management and knowledge management systems: conceptual foundations and research issues", *MIS Quarterly*, vol. 25, n. 1, pp. 107-136.
- Bae S. H., Yoo K. (2015), "Economic modeling of innovation in the creative industries and its implications", *Technological Forecasting & Social Change*, vol. 96, pp. 101-110.
- Barge-Gil A., Nieto M. J., Santamaria L. (2011), "Hidden innovators: the role of non-R&D activities", *Technology Analysis & Strategic Management*, vol. 23, n. 4, pp. 415-432.
- Becker, Howard S. (1982), *Art Worlds*. Berkeley: University of California Press.
- Benghozi P.-J., Lyubareva I. (2014), "When Organizations in the Cultural Industries Seek New Business Models: A Case Study of the French Online Press", *International Journal of Arts Management*, vol. 16, n. 3, pp. 6-19.
- Benghozi P.-J., Salvador E., Simon J.-P. (2015) "Models of ICT Innovation. A Focus on the Cinema Sector", edited by Bogdanowicz M., European Commission, JRC Science and Policy Report, doi:10.2791/041301, Report EUR 27234 EN, pp. 141.
- Benghozi, P.J., Paris T. (2007) "The economics and business models of prescription in the Internet" in Brousseau E. and N. Curien N. [eds.] *Internet and Digital Economics – Principles, Methods and Applications*, Cambridge (Mass), Cambridge University Press, pp. 291–310.
- Benhamou F. (2015), Fair use and fair competition for digitized cultural goods: the case of eBooks, *Journal of Cultural Economics* May 2015, Volume 39, Issue 2, pp 123-131
- Bettiol M., Sedita S.R. (2011), "The role of community of practice in developing creative industry projects", *International Journal of Project Management*, vol. 29, n. 4, pp. 468-479.

- Bhatiasevi V., Dutot V. (2014), "Creative industries and their role in the creative value chain – a comparative study of SMEs in Canada and Thailand", *International Journal of Entrepreneurship and Innovation Management*, vol. 18, n. 5/6, forthcoming.
- Bohnenkamp B., Knapp A., Hennig-Thurau T., Schauerte R., (2015), "When does it make sense to do it again? An empirical investigation of contingency factors of movie remakes", *Journal of Cultural Economics*, vol. 39, n. 1, pp. 15-41.
- Brandellero, A. M. C and Kloosterman, R. C (2010) 'Keeping the market at bay: exploring the loci of innovation in the cultural industries', *Creative Industries Journal*, 3(1), pp. 61–77.
- Brockhoff K. (2003), "Exploring strategic R&D success factors", *Technology Analysis&Strategic Management*, vol. 15, n. 3, pp. 333-348.
- Brown, S.L., Eisenhardt, K.M. (1998), *Competing on the Edge: Strategy as Structured Chaos*, Boston, MA, Harvard Business School Press.
- Carreiro, E. (2010) 'Electronic books: How digital devices and supplementary new technologies are changing the face of the publishing industry', *Publishing research quarterly*, 26(4), pp. 219–235.
- Caves, R., (2000), *Creative Industries: Contracts between Art and Commerce*, Cambridge, Mass: Harvard University Press.
- CBI (2014), *The Creative Nation: a Growth Strategy for the UK's Creative Industries*, CBI The Voice of Business, January, pp. 1-20.
- Chaston, I. and Sadler-Smith, E. (2012) 'Entrepreneurial Cognition, Entrepreneurial Orientation and Firm Capability in the Creative Industries', *British Journal of Management*, 23(3), pp. 415–432.
- Christensen C. (1997), *The innovator's dilemma*, Boston MA, USA, Harvard Business School Press.
- Cohendet P., Simon L. (2007), "Playing across the playground: paradoxes of knowledge creation in the videogame firm" *Journal of Organizational Behavior*, vol. 28, n. 5, pp. 587 - 605.
- Crossick, G. (2006) 'Knowledge transfer without widgets: the challenge of the creative economy', London: Goldsmiths, University of London, A lecture to the Royal Society of Arts in Leeds on 31 May 2006.
- Cunningham S. (2013), *Hidden Innovation: Policy, Industry and the Creative Sector*, University of Queensland Press, Australia.
- Cunningham, S. D., Cutler, T. A., Hearn, G. N., Ryan, M. D. and Keane, M. A. (2004) 'An innovation agenda for the creative industries: where is the R&D?', *Media International Australia Incorporating Culture and Policy: quarterly journal of media research and resources*, 112, pp. 174–185.
- Davy D. (2007), "The impact of digitization on the book industry", *Report Association of Canadian Publishers*, Toronto, Ontario, pp. 1-30.
- DCMS, (1998), *Creative industries mapping document*, Department of Culture, Media and Sport, 1st edition, London, UK.
- De Prato G., Simon J.-P. (2014), "Public policies and government interventions in the book publishing industry", *Info, The journal of policy, regulation and strategy for telecommunications, information and media*, vol. 16, n. 2, pp. 47-66.
- DiMaggio P. J., Powell W. W. (1983), "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields", *American Sociological Review*, vol. 48, pp. 147-160.
- Eltham, B. (2009) 'Australian cultural and innovation policies: Never the twain shall meet?', *Innovation: management, policy & practice*, 11(2), pp. 230–239.
- Flew, T. A. and Cunningham, S. D. (2010) 'Creative industries after the first decade of debate', *The Information Society*, 26(2), pp. 113–123.
- Florida R. (2002), *The rise of the creative class: and how it is transforming work, leisure and everyday life*, New York, Basic Books.
- Foundation for Research, Science and Technology (2003) *R&D Strategy for creative industries-a discussion paper*, New Zealand.
- Freeman C. (1974), *The Economics of Industrial Innovation*, Harmondsworth, UK, Penguin.
- Greco A. (2011), *The book publishing industry*, Taylor&Francis.
- Green, L., Miles, I. and Rutter, J. (2007) 'Hidden innovation in the creative sectors', *Manchester Institute for Innovation Research, Working Paper for NESTA*.
- Guiry, T., Horne, A., Skinner, B. and Spicer, M. (2012) 'Future of publishing', *Report NESTA*.

- Hannan M. T., Freeman J. (1984), "Structural Inertia and Organizational Change", *American Sociological Review*, vol. 49, n. 2, pp. 149-164.
- Harper, G. (2011) 'Practice-led research and the future of the creative industries', *Creative Industries Journal*, 4(1), pp. 5-17.
- HKU (2010), "The Entrepreneurial Dimension of the Cultural and Creative Industries", Hogeschool vor de Kunsten Utrecht, Utrecht, December, pp. 1-123.
- Hotho, S. and Champion, K. (2011) 'Small businesses in the new creative industries: Innovation as a people management challenge', *Management Decision*, 49(1), pp. 29-54.
- Howard N. (2009), "The Book: The Life Story of a Technology", The Johns Hopkins University Press, Baltimore, MD, ISBN 978-0-8018-9311-7.
- Howkins, J., (2001), *The Creative Economy: How People Make Money from Ideas*, London: Allen Lane.
- Jacobides M.G., Winter S.G. (2007), Entrepreneurship and Firm Boundaries: The Theory of A Firm, *Journal of Management Studies*, 44: 1213-1241.
- Jaw, Y., Chen, C. and Chen, S. (2012) 'Managing innovation in the creative industries-A cultural production innovation perspective', *Innovation: Management, Policy & Practice*, 14(2), pp. 256-275.
- Jisun, C. (2010) 'Creative industries and global co-development: Lessons from the first successful case in Korean online games', *Creative Industries Journal*, 3(2), pp. 125-136.
- KEA (2006), "The economy of culture in Europe", Study prepared for the European Commission (Directorate-General for Education and Culture).
- Lampel J., Lant T., Shamsie J. (2000), "Balancing Act: Learning from Organizing Practices in Cultural Industries", *Organization Science*, vol. 11, n. 3, pp. 263-269.
- Lazzeretti L. (2013), ed., 'Creative Industries and Innovation in Europe: Concepts, Measures and Comparative Case Studies', Routledge.
- Lazzeretti L., Capone F., Innocenti N. (2015), "The evolution of "creative economy" research", article presented at the XIII International Conference on Arts&Cultural Management (AIMAC), 26 June – 1 July 2015, Aix en Provence-Marseille, France.
- Leal, K. M. (2009) 'Technology: Friend or Foe to the Publishing Industry'.
- Lebert, M. (2009), "A short history of ebooks", NEF, University of Toronto.
- Lundvall B. (1992), ed., *National systems of innovation: towards a theory of innovation and interactive learning*, Pinter Pub.
- Mangematin V., Sapsed J., Schubler E. (2014), "Disassembly and reassembly: an introduction to the Special Issue on digital technology and creative industries", *Technological Forecasting&Social Change*, vol. 83, pp. 1-9.
- Miles I., Green L. (2008), *Hidden Innovation in the Creative Industries*, NESTA report, July, pp. 1-81.
- Miller C. (2013), "Digital-media transformation: what the e-book industry can teach us about selling digital content", *Informa, Telecoms&Media*, pp. 6-12.
- Müller, K., Rammer, C. and Trüby, J. (2009) 'The role of creative industries in industrial innovation', *Innovation: Management, Policy & Practice*, 11(2), pp. 148-168.
- Narula R. (2001), "Choosing between internal and non-internal R&D activities: some technological and economic factors", *Technology Analysis&Strategic Management*, vol. 13, n. 3, pp. 365-387.
- Nelson R. (2000), "National innovation systems", in Acs Z., ed., *Regional Innovation, Knowledge and Global Change*, pp. 11-26, London, Pinter.
- Nonaka I., Takeuchi H. (1995), *The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation*, Oxford, Oxford University Press.
- OECD (2012) 'E-books: Developments and Policy Considerations', *OECD Digital Economy Papers* No. 208.
- Oiestad S., Bugge M. M. (2014), "Digitisation of publishing: exploration based on existing business models", *Technological Forecasting&Social Change*, vol. 83, pp. 54-65.
- Parkman I. D., Holloway S. S., Sebastiao H. (2012), "Creative industries: aligning entrepreneurial orientation and innovation capacity", *Journal of Research in Marketing and Entrepreneurship*, vol. 14, n. 1, pp. 95-114.

- PIPAME (2012) 'Gestion des actifs immatériels dans les industries culturelles et créatives', Pole interministériel de prospective et d'anticipation des mutations économiques, Ministère de l'Economie, des Finances et de l'Industrie.
- Potts, J. (2009) 'Introduction: creative industries and innovation policy', *Innovation: management, policy & practice*, 11(2), pp. 138–147.
- Ronte, H. (2001) 'The impact of technology on publishing', *Publishing research quarterly*, 16(4), pp. 11–22.
- Roxane L. (2014), "The Cultural Industries in France and in Europe: Points of Reference and Comparison", *Culture Chiffres*, Ministère de la Culture et de la Communication Département des études, de la prospective et des statistiques, 2014-7, pp. 1-21.
- Santagata, W., (2009), White paper on creativity: Towards an Italian model of development.
- Scott A. J. (2006), 'Creative cities: conceptual issues and policy questions', *Journal of Urban Affairs*, vol. 28, n. 1, pp. 1-17.
- SGS (2013), Valuing Australia's Creative Industries, December, pp. 1-96.
- Steinmueller E. (2010), Economics of technology policy, in *Handbook of the economics of innovation*, North Holland.
- Stoneman P. (2010), *Soft innovation: economics, design and the creative industries*, Oxford University Press.
- Sung T. K. (2015), "Application of information technology in creative economy: manufacturing vs. creative industries", *Technological Forecasting & Social Change*, vol. 96, pp. 111-120.
- Thompson J. D. (1967), *Organizations in Action*, New York, McGraw-Hill.
- Throsby, D., (2001), *Economics and Culture*, Cambridge, Cambridge University Press.
- Tian, X. and Martin, B. (2010) 'Digital technologies for book publishing', *Publishing research quarterly*, 26(3), pp. 151–167.
- UNCTAD (2010), *Creative Economy Report 2010. Creative economy: a feasible development option*.
- Von Hippel E. (2007), "Democratizing Innovation", Cambridge, USA, MIT Press.
- Yoo, Y., Boland, R. J., Jr., Lyytinen, K., Majrczchak, A. (2012), "Organizing for Innovation in the Digitized World", *Organization Science*, vol. 23, n. 5, pp. 1398–1408.
- Zimmermann H. (1980), "OSI reference model. The ISO model of architecture for open systems interconnection", *IEEE Transactions on Communications*, vol. 28, n. 4, pp. 425-432.

Annex

<i>E-readers/tablets: some representative examples</i>
Rocket eBook of Gemstar (1998) <i>project failed in 2003</i>
Softbook (1998)
Franklin eBookMan (1999)
Cytale Cybook (2001) <i>project failed in 2002</i>
Sony Librie (2004) <i>project failed</i>
Sony Reader Portable Reader System (2006)
iRex iLiad (2006) <i>project failed in 2010</i>
Apple's iPhone (2006), Apple's iPad (2010)
Amazon Kindle (2007), Kindle2 (2009), KindleDX (2009), Kindle3 (2010), Kindle4 (2011), Kindle Fire (2011), Kindle Touch (2012), Kindle Paperwhite (2012), Kindle FireHD (2012), Kindle Paperwhite2 (2013), Kindle FireHDX (2013)
Cybook Gen3 (2007), Cybook Opus (2009), Cybook Orizon (2010), Cybook Odyssey (2011), Cybook Odyssey HD (2012), Cybook Odyssey edition 2013, Cybook tablet (2013)
Sony PRS-500 (2006), PRS-505 (2007), PRS-700 (2008), PRS-300 Pocket edition (2009), PRS-600 Touch edition (2009), PRS-900 Daily edition (2009), PRS-350 Pocket edition (2010), PRS-650 Touch edition (2010), PRS-950 Daily edition (2010), PRS-T1 reader Wifi (2011), PRS-T2 reader Wifi (2012), PRS-T3 (2013)
Barnes&Noble Nook (2009), Nook Wifi and Color (2010), Nook Simple Touch (2011, 2012), Nook HD and HD+ (2012), Nook Glowlight (2013)

Kobo (2010), Kobo Wifi (2010), Kobo Touch (2011), Kobo Mini, Kobo Glo, Kobo Arc (2012), Kobo Aura and Aura HD (2013), Kobo Arc7, 7HD and 10HD (2013)
Barnes&Noble Plastic Logic Que eReader (2010)
PDAs: Palm Pilot (1996), Microsoft Pocket PC (2000), Hewlett-Packard, Sony, Handspring, Toshiba, Casio