

Introduction

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1. INTRODUCTION

Technology development in information and communication is increasingly gathering pace. In particular, smartphone technology is rapidly advancing and we are seeing new breakthroughs every day. The Internet and mobility, combined together, are driving massive changes in our societies, boosting what has been called the ‘smart revolution’.

The smart revolution is so spectacularly pervasive that it is blurring boundaries between the real and the virtual worlds. The birth of intelligent technology marked the shift from the concept of mobile phones to that of smartphones. It is no longer simply about handheld devices that allow users to communicate with each other; it is about providers of highly advanced applications and functions, which rely on an ever astonishing ability to fit computing into our pockets.

Moreover, the emerging smart revolution is advancing the process of technology convergence between media, telecommunications and information technology, which were once distinct universes. The prerequisite for technology convergence is digitalisation, which has introduced a standardised information digital structure, enabling a whole new set of communication capabilities and opportunities. Predictions of technological singularity, meaning the unfolding of extra-human intelligent artificial technologies, leads us to understand that the implications of technological convergence are even broader than first predicted. Moreover, although first conceived of as a merging of previously separated fields related to technology, convergence is a multidimensional concept that goes beyond merely the field of technology. Indeed, it transforms economics, social, cultural and regulatory aspects of our societies.

The smart revolution needs to be modelled and analysed in order to understand its unique features and the roles played by the different entities and their interactions. To this end, the concept of a smart ecosystem shows promise. Within such a system, there are several roles to be played by different groups of entities that interact with each other and with their

environment. A main point is that there is not only competition, but also different kinds of cooperation, symbiosis and mutual interdependence between the various markets and players.

Moreover, the smart revolution cannot be separated from globalisation, in which economies, societies, cultures and policy-making processes have become integrated through the global network of trade and transactions, communication, migration and movement. Information and communication technologies (ICTs) have lowered the cost of and increased access to digitalised information and, thus, accelerated the diffusion of innovation and promoted growth and productivity. Indeed, the smart revolution is now pushing forward the globalisation process, further shortening both time and distance, and advancing mobility, dynamism and integration at full steam. A long-term and fundamental transformation of our societies is taking place, and it is therefore of great importance for us to reform and improve existing policy settings in light of these new realities.

In broader terms, the information society is the queen of globalisation. And this queen – known by many names (digital society, knowledge society, network society, post-industrial society, etc.) – has many suitors. A policy race towards leadership of the information society has appealed to Europe, the United States, Japan and other strong economies, over time. The 1980s saw Japan leading the scene, bringing forward the Integrated Services Digital Network (ISDN), with a vision of a nationwide ISDN network that would evolve into B-ISDN afterwards, to include broadband. In the early 1990s, the United States developed the vision of constructing National Information Structures and Information Superhighways, under the Clinton-Gore Administration. In those same years, the European commitment towards an information society got off the ground. Several policy initiatives were adopted, with the main goal of fostering access to broadband connectivity.

During the first years of this century, Japan consolidated its supremacy in the mobile Internet technology field, with the tremendous success of the i-mode service. However, the smart revolution is overturning the rules of the game, and both Japan and Europe have lost important leadership and initiative in this new phase. In fact, Europe, who it was believed was leading the mobile economy, is underperforming not only relative to other advanced world powers, such as the United States, but also to some countries from the Asia-Pacific region, which are emerging as very strong forces.

Against this backdrop, policies, strategies and research must be conducted on the relationships between ICT technologies, global policy and regulation in this new emerging reality, in order to reap the full benefits of the smart ecosystem. We are experiencing a very long-term and

fundamental transformation of our societies and therefore it is of great importance that we reform and improve existing policy settings based on these new realities, and conduct research to support such developments. Moreover, it is important for us to look even beyond the smart revolution. This book is one contribution to such an end.

2. AN OVERVIEW OF THE BOOK

This introduction will provide a brief summary of the following chapters in the book, and take up some pivotal issues for future research and policy pursued from a number of different perspectives towards and beyond the smart revolution. The book is divided into six parts, each focusing on different themes and aspects, as follows:

- Part I The ICT Ecosystem in Transformation;
- Part II What Did the Smart Revolution Achieve for Business and Society?;
- Part III New Issues Created by the Smart Revolution;
- Part IV Regulation Required for the Smart Revolution;
- Part V New Features in the Media Industry;
- Part VI The Smart Revolution in Countries.

Part I The ICT Ecosystem in Transformation

In Chapter 1, Anders Henten and Reza Tadayoni claim that the IT industry is leading the process of convergence between media, telecommunications and information technology. In support of this claim, the authors propose a theoretical framework building upon the basic concepts of convergence based on substitution and convergence based on complementation. To this, they add the structuralist concept of articulation to analyse the relationships between converging ICT sectors and the resource-based view (RBV) of companies with an extended sectoral perspective. Alongside this theoretical contribution to convergence theory, empirical evidence is examined corroborating the claim that IT is dominating the converging ICT sector. First, there is a comparison of the basic technological properties of Internet communications and telecoms. Furthermore, two cases are explored: one on the smartphone market and one on OTT TV. The two cases have an exemplary character illustrating the increasing dominance of the IT area in relation to telecoms and broadcasting, respectively.

Chapter 2, by Keisuke Takachi and Toshiya Jitsuzumi, calls for competition policy actions to cope with the changing market rules in the mobile

industry in Japan. The authors start from acknowledging the widespread adoption of mobile services, and the prominent role played by content provision in terms of revenue. They focus on the behaviour of smartphone makers in relation to content aggregation, while assuming a monopoly in the smartphone manufacturing market, for simplicity of analysis. Thus, by means of an economic model to analyse profit maximisation of content aggregator(s) and monopolistic smartphone makers, the authors demonstrate how separation between smartphone makers and content aggregators and, consequently, promoting competition among content aggregators generates greater benefits for society as a whole. The authors believe these results are not restricted to Japan, but can also be applied to other markets where smartphone use is rapidly proliferating.

Chapter 3, by Minoru Sugaya, describes the transformation of the ICT ecosystem focusing on the shift of economic power traditionally stemming from communication networks, to digital technologies. This kind of power, known as 'digital power' finds its best expression in the smart device age. The implications of this shift in terms of industry structure, business models and policy responses are outlined. The development of the IT industry is examined from the perspective of economic power and categorised into three periods: the age of network, the age of platform and the age of smart devices. Each telecommunication regulator has been organised within the age of voice telephone and analogue broadcasting and their function in each period is re-examined. Through this process, the development of government and business relationships is clarified. The conclusive aim of this chapter is to illuminate the future development trends in the ICT industry discussing whether traditional regulators are able to cope with environmental changes.

Part II What Did the Smart Revolution Achieve for Business and Society?

Chapter 4, by Hiroki Idota, Teruyuki Bunno and Masatsugu Tsuji, makes out the case for greater consideration of social media as valuable enablers of product innovation, in particular in service industries. The authors attempt to examine the relationship between the role of social media inside the firm and product innovation and focus on the following research questions: 1) whether social capital influences the use of social media; 2) whether social media promotes product innovation; and 3) how the effects of social media on product innovation differ between the manufacturing and service industries. The authors argue that social media such as blogs (short form of 'web logs') and SNSs (social network services/social network sites) ease the flow of information between final consumers and firms' related functions/units, thus promoting the sharing of information

that eventually contributes to product and process innovation. The analysis clarifies that well-informed social capital is a key factor for taking advantage of direct contact with customers by means of social media. For instance, if employees understand the objectives of the firm and collaborate with each other, SNSs can function well.

In Chapter 5, Kyoung-Youn Na and Chang-Ho Yoon report the results from an econometric analysis of complementarity between ICT and transportation infrastructures. By using dynamic panel data of OECD member countries, the authors empirically demonstrate the positive impact of widespread ICT use in its contribution to motorway infrastructure and production efficiency in developed countries. More specifically, the convergence of ICT and transportation technology has led to the development of the so-called intelligent transportation system (ITS), whose performance increases over time only if the ICT infrastructure grows concomitantly beyond a certain threshold level. The authors state that although the empirical analysis is carried out in OECD member countries, the pattern of complementarity can be applied to developing countries as well, where ICT convergence also takes place. They also point out the importance of measuring with accuracy the productivity effects of infrastructure investment.

The analysis of Akihiro Nakamura in Chapter 6 focuses on the role of ICT in disaster management, measuring the Japanese demand for countermeasures against natural disasters in the telecommunications field. The data are retrieved from an online survey that was conducted in collaboration with the Information Communications Research Institute of Japan in 2012, after the Great East Japan Earthquake hit the northern part of Japan, in March 2011. The results show that there is a very high willingness-to-pay (WTP) for provisions such as non-interruption of communications services and restoration of services within a 24-hour timeframe, with higher priority on mobile (voice) services when formulating appropriate backup plans for communication services during times of disasters. Moreover, the analysis has highlighted the national consensus on the necessity for countermeasures to be taken against the failure of telecommunications services. The novelty of this study relates to the absence of empirical studies for estimating the WTP for countermeasures in the telecommunication field.

In Chapter 7, relying on the same online survey used in the previous chapter, Hitoshi Mitomo, Tokio Otsuka and Mikio Kimura explore the 'Pythagorean effect' of media information in terms of people's contribution to and participation in the post-quake recovery process after the Great East Japan Earthquake. The data were collected from across Japan excluding the three heavily damaged prefectures and included more than

2000 samples aged from people in their teens to the over sixties. A two-fold approach was adopted. A deterministic approach was applied to construct a model to assess the contribution of media information and direct experience to post-earthquake behaviour. The study reveals that media information triggers information gathering while damage from the earthquake provokes countermeasures against possible aftermath events. An exploratory factor analysis is adopted to examine how people are impressed by media information and reveals different behaviour after the earthquake. In addition, the study shows that the role played by the Internet in providing information is still behind the substantive presence of television broadcasting.

Part III New Issues Created by the Smart Revolution

Chapter 8, by Rafael López, Teodosio Pérez-Amaral, Teresa Garín-Muñoz and Covadonga Gijón explores the problem of low-quality customer service in the mobile telecommunications industry. The authors provide theoretical support to the issue by using simple game theoretical models. Low-quality customer service levels are obtained as part of an equilibrium strategy profile for the firms. This is mainly owing to the existence of incomplete information: when signing a mobile phone contract, consumers cannot observe (*ex ante*) the operator's customer service quality and therefore firms may lack incentives to provide (*ex post*) high quality customer service levels. As a benchmark, the simple case of a one-shot monopoly market is investigated, showing that incomplete information leads to an inefficient outcome. Furthermore, the analysis of theoretical models with repeated interaction shows that the problem persists despite the introduction of competition. In terms of policy implications, this result suggests that inefficiencies should be solved through regulation via consumer protection.

Chapter 9, by Naoko Sakurai, addresses the problem of personal information leakage favoured by the adoption of ICT and the need to strengthen data protection systems. The study examines a sample comprising over 5200 incidents that occurred between January 2000 and December 2011 in a number of industry sectors. Specific attention was focused on the differences that existed among the types of industry that experienced leaks of personal information. The analysis reveals that particular sectors such as 'financial and insurance' and 'medical institutions' struggle the most with management of personal information. In addition, the results suggest that intentionally caused incidents tended to involve the leaking of large amounts of personal information. The final aim of this chapter is to discuss the problems and offer some concrete data that could

be used for devising efficient security measures and to contribute to the further refinement, improvement or revision of current laws.

Part IV Regulation Required for the Smart Revolution

In Chapter 10, Martin Cave and Keiko Hatta engage in a deep exploration of two regulatory challenges that have arisen as a result of the proliferation of smart devices. First, they focus on the regulatory implications of fixed/mobile convergence, which is challenging the traditional assumption made by regulators that fixed and mobile retail and wholesale services do not fall within the same markets. There is a growing number of mobile only consumers that consider fixed and mobile services as substitutes. However, there is also a growing complementarity between fixed and mobile that is likely to delay the abandonment of fixed regulation. The second topic is cloud computing. Here, the greatest regulatory challenge is to time interventions directed at promoting interoperability and permitting portability of data, while avoiding the suppression of innovation and competition. Because suppliers of cloud services are also providers of devices and their operating systems, vertical issues may also arise. Overall, this chapter highlights continuing tensions between the promotion of competition and innovation and continuing to protect end users in an ever-changing regulatory regime.

Chapter 11, by Hidenori Fuke, reports on the increasing number of consumers complaining of unexpectedly high international mobile roaming services (IMRS) charges in Japan, as a consequence of the diffusion of smart devices. The analysis of the IMRS system in Japan is taken as an example to demonstrate that excessive deregulation works against users' interests. In fact, the author argues that one factor behind the increasing problems with IMRS is the excessive deregulation of cellular services. The IMRS market is not currently competitive and, if market forces are not working, some degree of regulation is necessary in order to protect users. The main conclusion is that the absence of regulation in the cellular market has gone too far, and thus works to the detriment of users' interest. The author also denounces the drawbacks of an extremely complicated IMRS structure that is not easily understandable for users. The main aim of the author is to initiate discussion on IMRS in Japan towards a reconsideration of deregulatory measures.

Part V New Features in the Media Industry

Manabu Shishikura and Norihiro Kasuga in Chapter 12 provide an empirical analysis of user demand for variety in the broadcasting platform. The

author derives the demand function for channels and total TV watching time considering time and budget constraint, and shows that watching time is proportional to a user's available time while wages and price do not affect a user's total TV watching time. On the other hand, the demand for channels depends on the real wage rate, and a rise in wages increases a user's demand for the number of channels. Given the basic assumption that the viewing time of each channel is divided equally by the number of channels, the time spent watching each channel decreases as the total number of available channels increases. The authors empirically demonstrate the positive effect on the user of the increase in the number of channels. In addition, the result is that there is a difference in the marginal WTP for an increase in the number of channels between television advertising, public broadcasting and pay-TV. Moreover, the marginal WTP for additional channels of television advertising and public broadcasting is greater than that for pay-TV.

In Chapter 13, Yu-Li Liu suggests 'co-opetition' as the most viable strategy for the traditional and new media platforms to coexist in the smart ecosystem. Focusing on the media sector in Taiwan, the author discusses the competition among the players in the related TV market and analyses the impact of the newly emerging media on the traditional media platforms. The author argues that examples of cooperation and competition between different players such as new media, traditional platforms and content providers can often be observed in the media value chain. So, while newly emerging media services such as IPTV and OTT video services have begun to be popularised among users, by providing consumers with more choices, flexibility and convenience, traditional media have also found ways to match the new media platforms, adopting innovative business models characterised by time-shifting, on-demand and app delivery with different pricing options. With the impact of convergence and the structural change taking place in the media value chain, the players in the new ecosystem not only compete, but also cooperate.

Part VI The Smart Revolution in Countries

Chapter 14, by Gary Madden and Hasnat Ahmad, presents a snapshot of the Australian digital market and discusses evolving opportunities and challenges offered to consumers, businesses and the government. Consumers are changing, extensively using broadband for searches, gaming, media entertainment, social networking and shopping, and relying on smartphones and tablets for these purposes. This is stimulating retailers to develop digital strategies to meet customer expectations. For businesses, e-commerce provides opportunities to reduce costs

and enhance sales. Indeed \$189 billion of online orders were received during 2010–11. Importantly, 43 per cent of businesses report an online presence via a website, eBay store or social media page. This digital revolution is also encouraging online service delivery and engagement by the government. Examples of these developments include the Digital Local Government Programs that help communities in NBN deployment areas to develop planning applications, consultations and reports.

In Chapter 15, Ernst-Olav Rühle, Matthias Ehrler, Natascha Freund and Martin Lundborg focus on the puzzling development of NGA networks in the European Union. Despite the fact that the European Union has undertaken massive initiatives, for example by introducing the digital agenda for Europe, thereby aiming at the implementation of higher bandwidths for end-users, investment activity is still rather low and therefore, information and communication infrastructures as the basis for a sustainable digital society are not as far developed as in other continents. The authors elaborate the reasons why the European Union is still relying on copper networks to a great extent for technological as well as for commercial reasons by describing general trends as well as by looking at specific case studies in four national markets, i.e. Germany, the UK, the Netherlands and Switzerland. A comparison between these four countries is provided and some specifics in comparison to other regions of the world are highlighted.

Chapter 16, by Chatchai Kongaut and Erik Bohlin, makes a contribution in the area of regulation by giving an overview of the problems of market definition analysis and significant market power frameworks in the EU. The focus is on the European telecommunications sector, where economic issues along with service convergence are bringing new challenges to both operators and regulators. For example, the two-sided market in mobile telephony affects the mobile termination market when defining relevant markets. Similarly, platform competition and substitution between fixed and mobile need to be considered when defining relevant markets for wholesale broadband services. The analysis of this study is based on document analysis of previous studies and reports, including the public consultation in 2013 on the revision of the Recommendation on relevant markets. The authors conclude by emphasising the importance for the market definition and SMP analysis to balance policy between economics and law, static and dynamic, and consider market definition case by case, depending on the priority and situation in each member state perspective.

3. BEYOND THE SMART REVOLUTION: TOWARDS A SUSTAINABLE DIGITAL SOCIETY

The smart ecosystem poses new challenges, but also new opportunities. There is a continuous shifting and interdependence between global and regional interests that calls for a comprehensive approach towards the building of an information society. From a policy perspective, there is an increasing need to coordinate several policy areas, making ICT a more integral part of our society, given that the use of ICTs when conducting activities makes the economy more transparent and efficient, favouring sustainable growth and human development. For instance, there is wide agreement on the importance of accessible and usable telecommunications infrastructures in disaster management.

The bridges between the information society, global market and national competitiveness, and the critical and still unresolved concerns of sustainable development are growing in importance. The issue of sustainability has been rising on the world scene as one of the most significant issues for the future of mankind. First thought to be exclusively related to environmental preservation, it actually encompasses several social, economic and cultural aspects. Moreover, there has been a shift from a static perspective towards the preservation of existing settings to a dynamic approach towards the creation of future opportunities.

The key formula is the implementation of a sustainable information society. The information society is considered a strategic organising principle, instrumental for the long-term well-being of any nation or region. Policies and strategies need to be defined for the future development path of the information society, as pursuing development without attention to sustainability will turn out to be very problematic for humanity in the long run. Sustainability is a very long-term challenge, as it means providing non-declining future welfare, balancing both present and future needs in a global context. How to implement a sustainable information society is all the more important in the current globalised environment sought after by several world powers such as the United States, China, Japan, India, Russia and Europe, to mention just a few, which seek to stand out, while developing strategies for mutual consensus and collaboration necessary for their long-term prosperity and security. As the links between the information society and sustainability are not yet well developed, researchers from different disciplines are expected to focus their studies on this phenomenon.

Sustainability concerns the path towards growth and prosperity, based on ubiquitous access to information and the production of a non-exhaustible resource: knowledge. However, it must be clear that the

information society may generate both positive and negative trends; it is therefore important to evaluate the net effects of ICTs on sustainability. For instance, studies need to be focused on security issues, as cyber intrusions can have disastrous effects for humanity and, thus, need to be properly managed. Moreover, it needs to be understood to what extent the implementation of an information society impacts employment structures, labour skills and the development of various sectors such as public, health care, education and energy. Moreover, the consumption of ICTs greatly contributes to environmental pollution. From a cultural perspective, the information society might favour cultural homogenisation. It is still unclear whether this is critical for sustainable development or whether existing cultural identities must be protected. In the context of social sustainability, an important goal is to understand the impact of ICTs on lifestyles. Mobile Internet is considered a disruptive technology, given its potential to give rise to new ways of understanding, perceiving and interacting with and within the world. Concerns relate to the capability of living a life that can be sustained over time without compromising future generations.

An interesting ongoing debate centres on the concept of the well-being of a country. The idea pushed forward is that the traditional measure in terms of income or goods and services consumed by individuals partially represents the overall progress of a nation or region. The information society unavoidably impacts on the economy, but there is a psychological or subjective dimension of well-being that goes beyond the mere economic resources. It concerns measures of quality of life in its non-economic aspects.

Clearly, the pursuit of a sustainable information society has to face many challenges. The role of research is to improve our understanding of the relationship between the information society and sustainability in a geopolitical context, so that opportunities can be seized, while constraints can be restricted. This book is one step towards this ambitious goal.

