Industrial Policy and Digital Convergence Development: An Analysis of Cross-country Comparisons

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Abstract. Digital Convergence is the technology of integrating with the contents of communication, broadcast and information industries. This emerging industry has already caused changes in various industries, and it also brought the business opportunities which will improve the national competitive and advantage. This study aims to addresses the issue of industrial policy, though there exist many topics on digital convergence, such as society, infrastructure, and content. This study adopts method of comparative case study to perform an analysis of cross-country comparisons. The case is selected from the most representative ICT companies of US, UK, Japan, Korea, Mainland China and Taiwan. The findings are described as follows: each nation has worked hard to prevent confusion in competition. Moreover, each government has designated a major developmental project of digital convergence. The advanced countries have tried to make laws to regulate and protect intellectual properties. In developing countries, the government can better use the power of the nation to achieve value-adding objective of digital convergence. On the other hand, US and UK mostly adopt policies that allow enterprises and the market to operate and develop freely. China has the advantage of a huge consumer market. Finally, a thoughtful and quick-response industrial policy had better be developed.

Introduction

According to [1], there are three vertical industries, namely telephone, television and computer, with the five levels of value being content, packaging, transmission, manipulation, and terminal. Each of these five levels involves a specific area; however, as a result of vertical integration and convergence, merging and collaboration between businesses of different levels have started to take place. Research conducted in the past used to focus on a single industry to dress individual issues. Yet when expansion and corporate interests were concerned, effectiveness and networking had to be taken into consideration, just as pointed out by [2] that expansion and utilization of existing knowledge and techniques can provide directions in digital technology and corporate strategy researches. In industrial development and use of strategies, the areas influenced by fundamental information technology include organizational capacity, utilization of resources, procurement and strategy; thus, the framework of digital convergence is established. During this process, creative activities that build up competitiveness and marketing capacity, the key to profitability, are generated. Through creation of cost advantages, digitized connections and communications are made possible after fixed and wireless networks are constructed. Capacity-wise, academic research and technology have far exceeded application research performed after digital convergence [3]. There remain various issues with regard to the development of infrastructure and technology and the applications that people need. Nevertheless, in due time, they will be integrated and become the main axle of research. and this is exactly why this study stresses the importance of the infrastructure of digital convergence, the patterns of competition between enterprises, and business survival. This emerging industry has already caused changes in various industries, and it also brought the business opportunities which will improve the national competitive and advantage. The influential factors of the digital convergence include the organizational changes in enterprises, the reorganization and merger of the transnational

corporations, the integration of different types of industry and operation, and the value-added application yielded from new technologies; therefore, the development of the digital convergence industry is definitely one of the important research issues currently. This study aims to addresses the issue of industrial policy, though there exist many topics on digital convergence.

Literature Review

Digital contents and services are complex and diverse. They include cultural creativity, cloud services, travel, energy saving, etc., covering just about everything in human life. The whole digital convergence thus creates gigantic energy and the issues involved in service management and the corresponding studies can grow wider and deeper. The previous studies mostly emphasized the topics on digital convergence, such as policy, society, infrastructure, and content. But this study merely explores the topic of industrial policy. Lane Nea mentioned the United States government under Clinton administration in 1999 and identified a number of key areas of research according to the impact of the IT industry on national economic policies [5]. British science and technology indicators and transfers also referred to the close relationship between national policy and science. Scholars, researchers and periodicals such as (e.g., [6]; [7]; [8]; [9]; [10]; [11]), all mentioned how policies affected the progress of digital convergence and how digital convergence was tied down and restricted by policies [12]. Since China joined the World Trade Organization, the Standardization Administration of People's Republic of China (SAC) has been the ultimate guardian of standards in the country. In Europe, there are also organizations to handle technical issues in relation to standardization to prevent market failures from cancelling out the benefits of convergence. To cope with the rapid changes in the procedures and practices of public policies, related regulations have to be formulated in time. As the process of governance involves interactions between various parties and different results, responsiveness and timeliness become critical [13]. Without rules, the powers of the public and private sectors are likely to run out of control and convergence of technologies will lack support. In other words, convergence will be more likely to be successful if the government can respond promptly in its policies. In the EU, the new regulation of standardization administration has placed technological convergence under the supervision of both the public and private sectors. The reformed standardization system in China complies with the regulation of the World Trade Organization and has its international competitiveness. China has taken a firm stance toward liberalization and reform. In 2001, the State Council designated the SAC to be in charge standardization in the country. This indicates that national policies have an impact on the development of digital convergence [14].

Method

This study uses the case study method, and the case is the most representative ICT companies of the focal countries. From the perspective of service supply chain, we explore the country's development service model of digital convergence. We collected public information websites of all nations, Taiwan MIC and journals on digital convergence through secondary data of the case to increase the diversity of sources. The reliability and validity based on three principles of Data collection [15]. Use of multiple evidence sources: in the planning phase of the data collection, we use a wide range of information sources to increase the information saturation and try to satisfy the requirements of "data triangulation" [16] to improve "construct validity" of this study; in order to establish construct validity and reliability, the study emphasizes the "relevance" in the process. We explore interactively the relationship between relevant policies, communities, infrastructure, and the content industry in all the processes and analyze finally the trends to find a more reasonable managerial implication for the new digital era.

Results

This study obtains the following results after data analysis.

US: National Broadband Plan., adjustment of national administrative organizations

In 1999, the Federal Communications Commission (FCC) Integrated and managed telecommunications, broadcasting and media. In 1996, Telecommunication Act was established to permit the across operating between the telecommunications industry and the communications industry. In June of 2009, the wireless analog signals have been stopped; the industry promotes digitization of cable television by itself. The digital convergence policy of the Federal Communications Commission (FCC) of the United States promotes competition, removes restrictions, and provides investment incentives for facilitating the advancement of technological innovations. The amendments of the Telecommunications Act of 1996 lifted the restrictions that prohibited companies from crossing industrial boundaries. The United States digital convergence policy provides the media with an environment that is market-oriented. The Telecommunications Act of 1996 regulates specific industries. The United States antitrust law regulates competition in the general marketplace, and it is more lenient on commercial conducts that cross industrial boundaries, although it still sets restrictions on the merger of media businesses so as to avoid the over-concentration of media power and to protect the public and economic interests in maintaining a diverse media space.

UK: National Broadband Plan, adjustment of national administrative organizations

In 2003, The Office of Communications (OFCOM) was established to unify and be in charge of communications and media organizations. The Communication Act passed and adopted the horizontal regulatory framework. In 2012, the wireless analog signals have been stopped by division. A member of the European Union, the Great Britain also has clear and specific goals for the industrial development of digital convergence. The British are even more concerned about consumer interests and market equitability. The British have developed public service broadcasting while keeping strict control over the commercial telecommunications industries. The Communications Act 2003 of the United Kingdom regulates specific industries while the Enterprise Act 2002 regulates the competition of general industries. The British convergence regulates industrial mergers with legislation, but it also legislates laws to regulate specific industries in order to resolve issues of public interests.

Japan: u-Japan Promotion program, adjustment of national administrative organizations

In 2008, the Ministry of Internal Affairs and Communications (MIC) established the information and Communication Policy Bureau and integrated communication infrastructure Bureau. In 2004, the Telecommunications Business Law was enacted to amend and adjust the telecommunication regulatory framework. In July of 2011, the wireless analog signals have been stopped. The Ministry of Internal Affairs and Communications and Japan Fair Trade Commission passed laws on communications and broadcasting (similar to the Fair Trade Commission of the Executive Yuan in Taiwan) which establish standards for regulating the entities resulting from the cross-platform merger of businesses in telecommunications. Instead of the technology-leaning orientation of the past, the laws focus more on ICT technologies that are concerned about the everyday lives of ordinary people. IT Strategic Headquarters, the Basic Law on the Formation of an Advanced Information and Telecommunications Network Society have been earlier members of this development. E-Japan, e-Japan Strategies Ⅱ, and u-Japan policy were foundational infrastructure for the development of Japan's information and communications. They set the stage for the development of the future digital convergence.

South Korea: Vision and Strategy of National Information Development, adjustment of national administrative organizations

In 2008, Broadcasting Communications Commission (KCC) was established to regulate communications, radio, and spectrum policies. In 2009, the Broadcasting Act, the IPTV Act, and the Telecommunications Business Act were integrated into the Broadcasting and Communications Business Act. At the end of 2012, the wireless analog signals have been stopped; in 2013, the

penetration rate of digital. The government adopts business-oriented policies, and it is apparent that they work hard to ensure the policy execution at all levels of its hierarchy. Korea Communication Commission, or KCC, is the most important supervisory and managing agency in telecommunications and broadcasting. It values the services and technological development of digital convergence, the maintenance of equitability in market competition among nations, and the priority given to protect the rights of the users. These are apparently different from those in other countries. A single administrative system, the KCC, is wholly responsible for both developing and supervising the industry. This is vastly different from the systems used in other countries, where those responsibilities are typically performed by different agencies.

Mainland China:

The State Administration of Radio Film and Television and the Ministry of Industry and Information Technology of the People's Republic of China are responsible for the management of digital convergence affairs. In 2010, tri-networks integration of China's 12th Five-Year Plan. In 2011, "China Radio and Television Network Company" was established. The State Council of the People's Republic of China leads the drives for urbanization and telematics. It has spared no effort to push the integration and application of digital convergence. It encourages private investments in the development and application of Internet of Things, or IOT, in the hope of making electronic commerce popular and prevalent, developing business identification of non-financial transactions, and making laws to make broadband available throughout China. In the wake of the successful smart city pilot tests in 2010 in Wuhan and Shenzhen, the Ministry of Industry and Information Technology of the People's Republic of China tested in Yangzhou and Changzhou in 2011 followed by 193 test cities in 2013. It has planned to expand the test to 600 cities in the future. They use such an orderly and widespread implementation of digitalization in conjunction with the energy and resources of telecommunications enterprises, private entities, government agencies, and the public service funds to reach the benefit goal of digital convergence, which is the manifestation of one of the 12th Five-Year Plan in China.

Taiwan: Digital convergence development programs

In 2006, National Communications Commission (NCC) was established. In 2012, the Executive Yuan established an "ad hoc group for digital convergence" to supervise, coordinate and promote digital convergence work in Taiwan. In June of 2013 (2014), the framework of the digital convergence. Regulatory is expected to be adjusted and passed. In June of 2013 (2014), the framework of the digital convergence regulatory is expected to be adjusted and passed. The widespread digitization of Cable TV is expected to implement in 2014, but it is already finished early in 2012. The NCC has quickened its pace in formulating digital convergence policies ever since its inception. It offers three approaches: first, the digitalization of cable television, second, the prevention of any single entity from holding monopolistic powers over a market, three, the promotion of new technologies in telecommunications and broadcasting. The NCC is an independent agency functioning in between the market participants and the market supervisors as a civilian association between the telecommunications and broadcasting industries, and as the guardian of equity and justice between the rule of law and society. These are irreplaceable roles and position that only the NCC could play. The Executive Yuan on April 11, 2011, decided that the year 2012 would be the inaugural year for high-definition TVs in Taiwan and that all cable televisions in Taiwan would be digital by July 1, 2012. The NCC plans to complete the legislation of the Digital Convergence Act by 2014 to regulate the industries after the digital convergence.

Discussions and conclusions

In the wake of digital convergence, the competition landscape in all related digital industries has undergone significant changes. Each nation has worked hard to prevent confusion in competition and to maintain orderliness in the market. And the nations also actively nurture the growth of industries related to digital convergence and try to improve their international competitiveness. Moreover, each

government has designated a major developmental project of digital convergence, actively sought to relax or amend its laws, and provided a platform on which businesses may compete fairly. Due to the large number of industries involved in digital convergence, much integration between many specialized fields needs to take place; furthermore, many key technologies are still evolving. Every nation faces severe challenges in the cultivation and recruitment of professional personnel.

The advanced countries have tried to make laws to regulate and protect user rights, patents, intellectual rights, and personal information so that they may avoid the pitfall of getting the benefit of digital convergence at a cost of the most basic requirements of civilization. In developing countries, the government takes the lead in adding value to digital convergence; therefore it can better use the power of the nation to achieve that value-adding objective. On the other hand, US and UK mostly adopt policies that allow enterprises and the market to operate and develop freely. China has the advantage of a huge consumer market and an advantageous environment in which to develop digital demands and obtain an industry value chain. Therefore China is highly confident in the future development of digital convergence. Moreover, the rise of China and Korea has made international competition increasingly fierce among industries in digital convergence, leading to a concentration of talents. This may also lead to a concentration of business opportunities and profits in the future, which may in turn lead international economies to be out of equilibrium and reshuffled. With huge backing from their governments and conglomerates behind them, big-name electronic companies in countries, such as Samsung, have introduced digital convergence products. The slower pace of digital convergence policies in Taiwan makes it harder to identify specific items in which Taiwan is superior to other nations. This is also something for all governments to ponder.

From horizontal supply chain integration before digital convergence, such as OEM, parts supply, and the design and creation of new content, to vertical supply chain integration after digital convergence, such as unibody, content-added service, and customized demand, the creation of profit from social clouds, apps, content, infrastructure, and devices cannot be reached by any single factor. Each factor, if missing, may lead to an incomplete harvest of revenues. Digital convergence affects businesses. Technology giants like Apple, Microsoft, Amazon, Google, Samsung, and Facebook represent strengthened content creation, message transmission, online service, integration of hardware and software, design, and manufacturing. They fully reflect how quickly this convergence has come and how swiftly changes can take place. In addition, observations about how governments establish digital convergence policies, the effectiveness of policy execution, and collaborative relationships between the government and businesses reveal that nations lose competitiveness if they are slow in establishing digital convergence policies or if their businesses have not been able to keep pace with the rapid development of digital convergence. Therefore, a thoughtful and quick-response industrial policy had better be developed under these considerations.

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