



Contents lists available at ScienceDirect

Journal of Open Innovation: Technology, Market, and Complexity

journal homepage: www.sciencedirect.com/journal/journal-of-open-innovation-technology-market-and-complexity

Regulation architecture of open innovation under digital transformation: Case study on telemedicine and for-profit-hospital

JinHyo Joseph Yun^{a,b,*}, Xiaofei Zhao^{a,b}, Zheng Liu^c^a Daegu Gyeongbuk Institute of Science and Technology, South Korea^b Open Innovation Academy, South Korea^c University of Greenwich, UK

ARTICLE INFO

Keywords:

Regulation
Regulation conversion
Deregulation
Telemedicine
For-profit-hospital
Open innovation

ABSTRACT

This research seeks to answer the following research question “*What kind of regulation architecture can stimulate creative destruction and growth of two different types of new industries like telemedicine, and for-profit-hospital?*” Online interview method was used to investigate the telemedicine industry and for-profit-hospitals at Daegu-Gyeongbuk province in South Korea and Cardiff-Wales in the UK. Findings provided following grounded theories. First, the way to create a converted new industry is not deregulation but regulation conversion. Though, deregulation helps to expand the modern market, it could disturb the emergence and growth of new markets. Second, the regulation can be an essential policy method to create emerging new markets when there are enough (potential) suppliers owing to technological developments or the accumulation of a new workforce equipped with new technologies. According to the UK for-profit-hospitals, regulations for consumer protection and decreasing transaction costs or complexity in the new market could trigger market creation. Third, digital transformation has motivated open innovation dynamics in all industries. The expanded open innovation dynamics with digital transformation can promote, most of all, the appearance of converted new industries like telemedicine.

Introduction

With the digital transformation in the fourth industrial revolution era, new industries and markets have emerged and are regarded as substitutes for modern markets (Lee et al., 2018). Moreover, new industries are motivated by the open innovation paradigm, which differs from existing industries, such as the car-sharing industry compared to the automotive industry, the house-sharing industry compared to the hotel industry, the telemedicine industry compared to the hospital industry, or the food delivery industry compared to the restaurant industry (Chesbrough, 2003). The process of creative destruction that revolutionizes from incessantly destroying the old one and creating a new one, is the essential fact about capitalism (Schumpeter, 1942).

In fact, the role of government in the promoting creative destruction of an industry is not explored enough except the deregulation from new classical economists (Bailey and Baumol, 1983). Deregulation in the transportation, communications, energy, and financial industries during 1970–80 s in the USA had been strongly supported by new classical economists (Winston, 1993). However, there is not enough research on

the policies to motivate the increase of market in the converted new industries with digital transformation such as telemedicine (converted from hospital), electronic cars (converted from the internal combustion engine car), or food delivery (converted from restaurant), which are different from the emerging new industries like for-profit-hospital, intelligent robot industry, 3D industry, or artificial intelligence based Chat-GPT because emerging new industries are appearing as totally new in industry boundary, industry supplier, industry customer, or industry rule, etc. (Yun et al., 2019b).

This paper seeks to answer the following research question, “*What kind of regulation architecture can stimulate creative destruction and growth of two different type of new industries like telemedicine and for-profit-hospital with open innovation dynamics under the digital transformation?*”

While telemedicine in South Korea had been allowed partially from Corvid pandemic like Table 1, it had been adopted in the UK before the pandemic already (Lyuboslavsky, 2015, p. 6). In the case of for-profit-hospital, it had been permitted step by step in UK, it is not allowed until now in South Korea. Thus, by analyzing open innovation dynamics of telemedicine, and for-profit-hospitals in Daegu-Gyeongbuk,

* Corresponding author at: Daegu Gyeongbuk Institute of Science and Technology, South Korea.

E-mail address: jhyun@dgist.ac.kr (J.J. Yun).

<https://doi.org/10.1016/j.joitmc.2024.100252>

Received 5 February 2024; Received in revised form 28 February 2024; Accepted 13 March 2024

Available online 16 March 2024

2199-8531/© 2024 The Author(s). Published by Elsevier Ltd on behalf of Prof JinHyo Joseph Yun. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Table 1
Telemedicine and for-profit-hospital in 2 countries.

Categories	United Kingdom	South Korea
Telemedicine	<ul style="list-style-type: none"> - Guideline by national health service, and Health and wellbeing board - National program for IT in the NHS, WSD Telehealth, and Telecare, NHS PACS, and Airdale hospital - Paid by national and local government 	<ul style="list-style-type: none"> - Not allowed by laws - Temporary allowed during Carnivorous pandemic - Very limited allowed from 2023 after pandemic after first face-to-face medical treatment
For-Profit-Hospital	<ul style="list-style-type: none"> - Public introducing by "Health car Social Care Act" in 2012 by Conservative party. - real introducing 2000 s by labor party through 'management buy-out' or 'private finance initiative (PFI) - Maximum nearly 30% of total medical service 	<ul style="list-style-type: none"> - Introducing for-profit-hospital in Jeju island from government in 2009 - Law revising to expand the for-profit-hospital in Jeju, 2012. - Cancellation of introducing for-profit-hospital for domestic people in Jeju and all south Korea area, 2023

Source: made by authors

South Korea, and Cardiff-Wales, we can answer the research question. In other words, we could understand the different of two regions in the process from creative destruction to the growth of converted new industries, or emerging new industries.

Literature review, research framework, scope and method

Literature review

Deregulation

Keynes announced that comprehensive socialization of investment could improve in only means of securing an approximation to full employment though this need not exclude all manner of compromises and of devices by which public authority will co-operate with private initiate (Keynes, 1936, p. 165). But, Hayek stated, "Regulation on production and price by the government is limitless in power, and it motivates the sequencing regulation of the consumption of the consumer" (Hayek, 1943, p. 147). But, new classical economists generally agree on the requirement of regulation in 3 areas: 1) negative externalities, meaning businesses and consumers ignore the costs they cause for which they are not charged; 2) the tragedy of the commons, referring to public goods that are abused if not regulated or rationed; 3) monopoly, meaning the monopolistic control of industries including oligopoly (Kotler, 2015, p. 96).

The demand for regulation is for the potential uses of public resources and power to improve the economic status of economic groups such as industries and occupations (Stigler, 1971). The coercive power of governments can give valuable benefits to particular individuals or groups with economic regulation which is governed by the laws of supply and demand (Posner, 1974).

The economic theory of regulation has weakened the traditional perspectives on regulation. Accordingly, regulation is a device for protecting the public against the adverse effects of monopoly. It is procured by politically influential groups, assumed to be composed of the members of the regulated industry, for their protection (Posner, 1971). Additionally, the competition among pressure groups for political influence determines the equilibrium structure of taxes, subsidies, and other political favors organized by regulation (Becker, 1983).

Sunstein (1990) proposed the requirement of deregulation by the proposal "paradoxes of the regulatory state," which means self-defeating regulatory strategies – strategies that achieve an end precisely opposite to the one intended or to the only public-regarding justification that can be advanced in their support. According to this logic, which

overestimates markets, the self-defeating regulatory strategies motivate the following paradoxes: 1) overregulation produces underregulating; 2) stringent regulation of new risks can increase aggregate risk levels; 3) to require the best available technology is to retard technological development; 4) redistributive regulation harms those at the bottom of the socioeconomic ladder; 5) disclosure requirements may make people less informed; 6) independent agencies are not independent (Sunstein, 1990).

Economic deregulation takes additional time for the deregulated industries to adjust to their new competitive environment. Moreover, because deregulation does not necessarily motivate technological change, deregulation should allow the rapid application of innovations by providing increased operating freedom and a competitive environment that stimulates innovation (Winston, 1998). Economic regulation of industries was one of the most critical experiments in economic policy of our time.

Regulation conversion including permission less innovation, institutional void, or new institutionalism

The economic state does not emerge simply from preceding economic conditions but from the preceding total situation, which may include government regulation such as regulation conversion. According to Schumpeter, the theory of development is nothing but a treatment of this phenomenon and the processes incident to it (Schumpeter, 1934, pp. 58, 64). The economic endogeneity of science and development and universities are the main contents of innovation and the main targets of governments' market intervention to create value in the mission of capitalism. This requires regulation building or regulation conversion, not deregulation.

If the animal spirits of humans are regulated from the findings of behavioral economics, several fundamental problems of the capitalist economy can be solved. These problems are, for instance, inflation with unemployment, the escalation of inequality, and the increase of unemployment, according to Keynesian behavioral economists such as George A. Akerlof and Robert J. Shiller (Akerlof and Shiller, 2010, p. 31).

New businesses have emerged during the recent digital innovation in the sharing economy. They operate outside of established regulatory frameworks – without governmental permission, which is referred to as permission-less innovation (Gobble, 2015). Permission-less innovation is the idea that "experimentation with new technologies and business models should generally be permitted by default (Thierer, 2016, p. 3). This is opposed to the so-called precautionary principle reasoning. If permission-less innovation means the freedom to explore new technologies or businesses without seeking prior approval, it could be incentive for third parties to contribute to solving challenges that lie beyond the capacity of firms in traditional industries (Chesbrough and Van Alstyne, 2015).

Permission-less innovation is not an absolutist position that rejects any role of government. Rather, it has an aspirational goal that stresses the benefits of "innovation allowed" with the default position to start regulation policy later (Thierer, 2014). Policymakers should wait to see what concerns emerge and devise ex-post solutions as needed (Thierer and Camp, 2017; Yun et al. 2019a).

Institutional void typically refers to the absence of a strict rule of law. In the social entrepreneurship literature, the term describes conditions of limited government support, especially for social programs. Under such conditions, social needs such as poverty and environmental pollution are abundant, triggering great demand for social entrepreneurs (Stephan et al., 2015). The institutional void in transition economies has generally resulted in a lack of stability, necessitating the dominance of personal trust among entrepreneurs which is different from generalized trust (Puffer et al., 2010). Economists have elaborated on how institutional voids prevent the efficient functioning of markets by increasing the costs of transacting, expressing that institutional voids hinder market functioning and hamper market development (Mair and Marti, 2009).

According to the new institutionalism, not institutional void but well-organized institutions, including regulation, can motivate economic growth and development, even though in the new institutionalism, the scope of institutions is focused on market creation and maintenance (Acemoglu and Robinson, 2008). Due to the limitations of human intellectual capacities in comparison with the complexities of the problems, individuals, organizations, or institutions, that come through the regulation calls for simplified models, or sub-goals that could capture just the main features of a problem without capturing all its complexities (March and Simon, 1993, pp. 173, 190).

Telemedicine and for-profit-hospitals

The rise in the connected the Internet of Things, including the Internet of Medical Things devices from 2003 to 2020 enables sharing not just with a doctor or nurse but with anyone—family members such as older individuals with care workers, or peers such as a network of friends to set up a managed competition (“cooperation”) for best physiologic metrics (Topol, 2015, pp. 11, 12). Telemedicine is being adopted rapidly, with double-digit growth in the US telemedicine market owing to the following key drivers: 1) high-deductible insurance plans, 2) risk-based reimbursement contracts and reimbursement cuts, 3) increasing reimbursement and licensing expansion for telemedicine, 4) the switch to paperless medical records, and 5) high overhead costs for medical providers (Lyuboslavsky, 2015, p. 6).

The past decade saw telemedicine finally cross the chasm, which means the gap between use by a few visionaries and acceptance by an early majority of pragmatists (Dorsey and Topol, 2020). In response to the COVID-19 situation, the Centers for Medicare & Medicaid Services and commercial health plans largely waived co-pays for telemedicine visits to encourage usage in this time of need. Allergists need to pay attention to this because telemedicine can be used to manage chronic diseases such as asthma and immunodeficiency, particularly when social distancing is encouraged (Portnoy et al., 2020). Within days, a revolution in telemedicine arrived at the doorsteps of primary care doctors in the UK, Europe, and the USA. As a proposed solution for treating medical problems during the COVID-19 pandemic in the UK, telemedicine proved valid and acceptable to dementia patients and care home staff. Nonetheless, it is not an integral part of routine practice in the UK (McGee et al., 2020).

There is ongoing debate regarding the effect of ownership on hospital performance: 1) A profit incentive may improve efficiency and, perhaps, observable quality; 2) However, profit-seeking may also encourage management to exploit market power, either by raising prices or lowering quality in ways not observable by consumers (Picone et al., 2002).

For-profit-hospital care in the UK became pay hospitals before World War I, positioned between the not-for-profit hospital care on the left and the for-profit-hospital care on the right with the percentage of self-pay patients or pay beds changing. For-profit-hospitals in the USA increased from 24% of the total number of hospitals in 2007 to their peak at 27% in 2016, showing financial fragility.

Research framework

Every industry, including telemedicine, or for-profit-hospitals, falls under the different contexts of technology and political economy in the belonging regional innovation system, or national innovation, and each evolves diversely. According to evidence from the US bio clusters, knowledge differences allow the bioindustry based in several US regional innovation systems to develop in different directions (Cooke, 2001, 2005). Telemedicine, or for-profit-hospitals, might evolve according to technological context, geographical market location, political situation, or institutional conditions (Bergek et al., 2015; Dosi and Nelson, 2010).

Under the contexts of political economy, or the regional innovation system, an industry could be located in one of the following four

situations: (A) big consumer and small supplier; (B) big consumer and big supplier; (C) small consumer and big supplier; (D) non-industry with small consumer, and small supplier as shown in Figure 1. Three different regulation policies could be considered in these four conditions. First, regulation conversion will help motivate industry growth from (A) big consumer and small supplier to (B) big consumer and big supplier. Second, the regulation will help trigger market growth from (C) small consumers and big suppliers to (B) big consumers and big suppliers. Third, deregulation could be used to expand the modern markets, which are approaching the mature stage. However, deregulation may be limited in expanding consumers and the market in addition to 1) disturbing the appearance of new industries and 2) decreasing customer surplus.

The Telemedicine industry of South Korea is located in “(A) big consumer and small supplier,” similar to many converted new industries from new technologies including digital transformation based on existing markets, such as the car-sharing (taxi industry as existing market), autonomous car (automotive industry as existing market), and house-sharing industries (hotel industry as existing market).

In the context of digital technology and insurance systems, the telemedicine of South Korea can move to “(B) big consumer and big supplier” with regulation conversion alongside the creation of the telemedicine industry, as shown in Figure 1. The real situation of regulation conversion will be analyzed from the research on telemedicine in South Korea.

However, the deregulation of the UK’s for-profit-hospitals can further expand the market of “(B) big consumer and big supplier.” Nonetheless, the deregulation of the UK’s for-profit-hospitals could disturb the appearance of new industries, such as telemedicine, according to the literature review. The real situation of deregulation in (B) will be analyzed from the study of the UK’s for-profit-hospitals.

“(C) small consumer and big supplier” is an emerging new industry growing up from new technologies, even though the market is not big enough. The market size could be increased if regulations protect customers sufficiently and environments are well institutionalized according to the literature and the theory of Keynes (Carter, 2021). One example is the drone industry or the intelligence industry. The study on regulation and market creation will be explored from the telemedicine of the UK.

Research scope and method

We used several steps’ different research method like Figure 2.

First, the concept model for regulation conversion and deregulation in structure and process was developed through the literature review on regulation, deregulation, and regulation conversion for for-profit-hospitals and telemedicine Table 2. From the literature review, the first draft of the semi-structured questionnaire was developed. This research is mainly not based on positivism but post-positivism to find out the discovery of grounded theory which could be applied to policies for creating new industries with transforming or destroying existing industries under the digital transformation (Glaser and Strauss, 2017). Though the grounded theory is a constellation of methods, it is basically based on the qualitative like an in-depth interview (Charmaz, 2014, p. 14).

Second, based on the semi-structured questionnaire which had been developed from the literature review, an advance offline interview of doctors had been on May 20th, 2021, between March 2021 – June 2021 in addition to May 20th 2021. These interviews were used for expert diagnoses of health system failures and blockages of UK and Korea in advance. From the interviews, several possibilities in telemedicine and for-profit-hospital including improving diagnosis in health care, related knowledge management systems, and etc. could be obtained (Abu-Naser et al., 2010). The results of the interviews were applied to the updating of the semi-structured questionnaires and the fascinating research design.

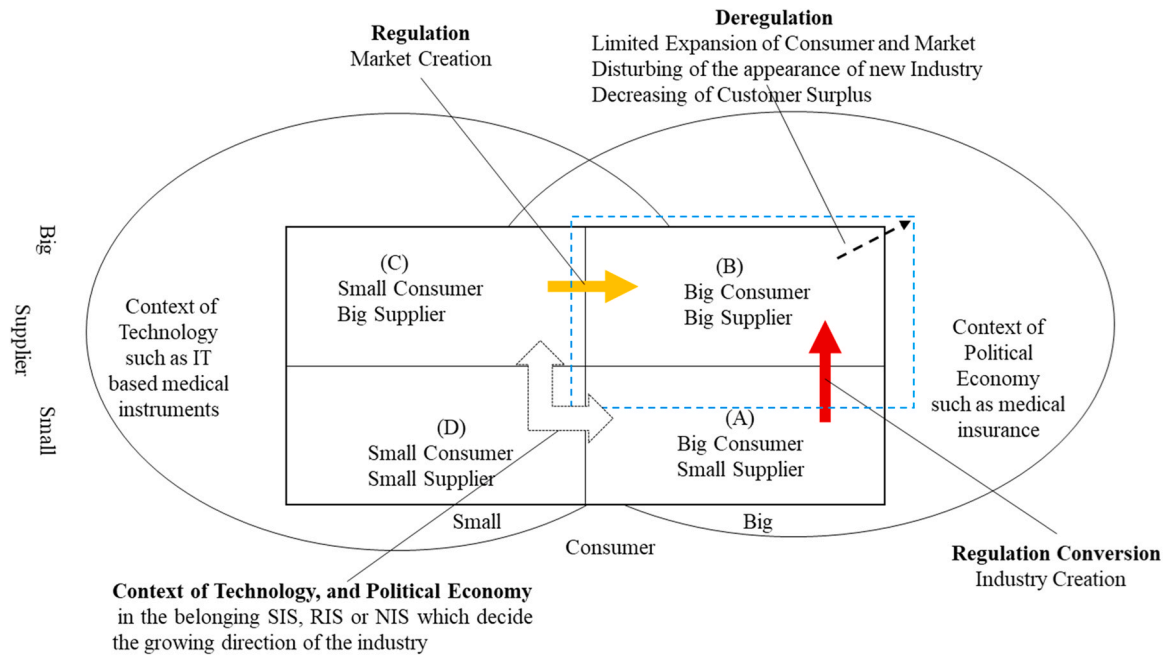


Fig. 1. Research framework.

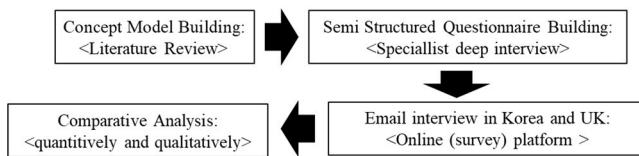


Fig. 2. Research steps and methods.

Table 2
Research method and research scope.

Research Method	Research Scope
Literature Review	Research framework development, Semi-structured questionnaire design
In advance offline interviews of doctors	2 Korean doctors' interview on May 20th, 2021 4 more Korean and 2 UK doctors' interviews from March 2021 – to June 2021.
Online Interview with semi-structured Questionnaire	South Korea: November 10th, 2021 - December 19th, 2021, through Web and Mobile Survey Platform DoITSurvey based online email interview Interviewee composition 1) Customers: 103 citizens (20–30 s future; 40–60 present) 2) Supplier: 51 medical doctors from Daegu-Gyeongbuk Province United Kingdom: September 28th, 2021- October 22nd, 2021 (customer), October 13th, 2021-October 20th, 2021 (doctor), through Survey-Monkey based online and email interviews Interviewee Composition 1) Customers: 96 citizens (20–30 s future; 40–60 s present) 2) Supplier: 50 medical doctors from Cardiff-Wales

Third, with this semi-structured questionnaire, interviews which is based on online interview platforms such as DOITSurvey in South Korea, and SurveyMonkey were done. The target of the online interviews were

customers of medical services which consists of future customers 20–30 s citizens, and doctors as a supplier of medical services Table 2. Customers under 40 could be categorized as a more future-oriented customer of medical services than citizens over 40 who are more frequently visiting the hospital because citizens under 40 s do not visit the so frequently hospital.

There are differences between offline interviews and online interviews. Online interviews by asking interviewees could receive answers on delicate issues like telemedicine and for-profit-hospital though it could not produce deep answers with additional asking at the moment like offline interview (Flick, 2021).

Analyzing telemedicine in South Korea and UK

This research takes Daegu in South Korea and Cardiff in the UK as the representative cities for in-depth analysis and comparative studies.

Telemedicine in South Korea

In South Korea, a high demand for telemedicine (on average, interviewees rated 4.0 out of 5 points regarding the degree of agreement on telemedicine, as shown in (Figure 3) is accompanied by a low IT medical instrument level, despite there is a high information technology level, and, the well-established medical public insurance. The willingness of doctors to supply telemedical service is not high, as shown in Figure 3 (on average 3.1 out of 5-point measures according to interviews, as shown in (Figure 3). One consumer over 40-year-old stated, “As soon as possible, telemedicine should be introduced and be expanded even though it should be separated from offline medicine.” Another consumer aged over 40 years claimed “In this pandemic, telemedicine is not a choice but necessary.” A consumer under 40-year-old pointed out, “The usage of telemedicine should be taught because it includes several complex medical instruments.”

Consumers' requirements are considerably high in the following items: 1) legislation for remote medical monitoring, 2) legislation for remote medical treatments, 3) legislation for the qualification and responsibilities for providing remote medical assistance, and 4) legislation for medical insurance regarding telemedicine. The regulation conversion requirement is considerably high because a gap exists between

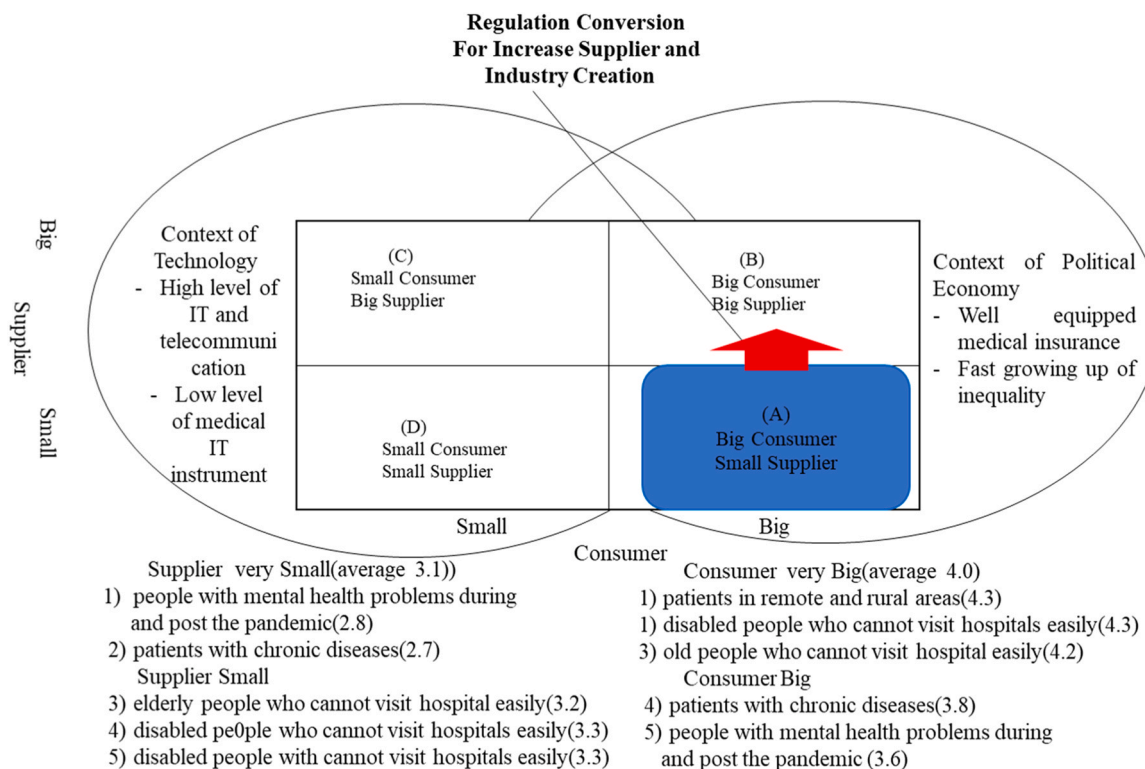


Fig. 3. The situation of telemedicine in Daegu-Gyeonbuk province in South Korea.

consumers and suppliers, which implies that the regulation conversion should conquer the gap. In contrast, the regulation conversion requirement for doctors in South Korea is not high. One consumer over 40-year-old pointed out that “Telemedicine law should be made including a clause about prohibiting patients who do not need to visit directly big hospital from going to big famous hospitals.” Another consumer over 40 years old said, “Any clause, which treats complaints from telemedicine patients or medical accidents from telemedicine.” One consumer under 40 said, “The conditions for telemedicine should be defined generally to include the future expansion of telemedicine technology and consumers.”

Moreover, regulation requirements for telemedicine by consumers and suppliers are not high in the following items: 1) regulation in geographic areas, 2) regulation in specific healthcare institutions, and 3) regulation regarding priority people with special needs (older adults, disabled). One doctor pointed out that “Telemedicine should be allowed in a very limited condition.” One consumer aged over 40 years old said, “Nobody needs telemedicine for the welfare of patients in the starting situation of telemedicine.”

Results from South Korean consumer interviews highlight the three primary beneficiaries: 1) older adults and disabled people who have difficulty accessing hospitals, 2) patients in remote and rural areas, and 3) patients with chronic diseases. One consumer said, “Telemedicine should be provided to any patient who needs it, and it should be provided by doctors directly.” Another suggested that “Telemedicine should be provided for the benefit of patients, not for the benefit of others.”

The cost of telemedicine, in other words, the target of regulation conversion for telemedicine, which was agreed by supplier and consumer together, is “the complete treatment via telemedicine.” One doctor highlighted, “The possibility of a wrong decision by a doctor during telemedicine could not be escaped. It should be considered.” One consumer proposed, “Telemedicine should be controlled by the government directly.”

Telemedicine in the United Kingdom (UK)

In the UK, for-profit-hospitals have reached 20%–30% of the total

number of hospitals, despite the long history of public medical insurance. Moreover, there is a fast-growing IT based medical instrument industry, such as the “Virtual Ward” model, technology-driven diagnostic, and clinical decision-making. The UK telemedicine has a considerably high supplier attitude (on average, interviewees rated 4.0 of 5 point measures, shown in (Figure 3) and high consumer attitude (on average, interviewees rated 3.9 out of 5 point measures), illustrated in Figure 3 (Liu et al., 2022). One consumer under 40 years old pointed out, “Those who are otherwise vulnerable, such as mothers or young children, should be the target of telemedicine.” Another consumer over 40 said, “Everyone could receive the telemedicine service.”

The regulation conversion requirement is low because the gap between suppliers and consumers in the related requirements is small. This is because the powers from both sides are balanced, in terms of 1) supplier average, 4.1, and 2) consumer average, 3.9 (Figure 4). One consumer under 40-year-old said, “I am unsure, but I believe this needs to be highly regulated to ensure a good standard of care as expected.” Another supplier pointed out, “We need to set up the information governance of telemedicine to develop it.”

Moreover, the requirement for deregulation is high because consumers and suppliers together answered positively regarding redefining the condition and scope of telemedicine as follows: 1) telemedicine priority for people with special needs (older adults, disabled); 2) telemedicine priority for some geographic areas (islands or rural areas with limited hospital access; 3) telemedicine priority for people with mental health problems during and post the pandemic; 4) telemedicine priority for specific healthcare institutions (e.g., primary healthcare sectors/GPs). One supplier said, “It should be available for all institutions.” Another supplier emphasized, “Telemedicine should be given to vulnerable populations as soon as possible.”

UK medical service consumers specifically highlighted 1) increased telemedicine service for patients with chronic diseases, and 2) the telemedicine service from secondary or tertiary healthcare providers like medical specialists as complementary manpower for medical doctors. One consumer under 40-year-old mentioned, “Telemedicine can be

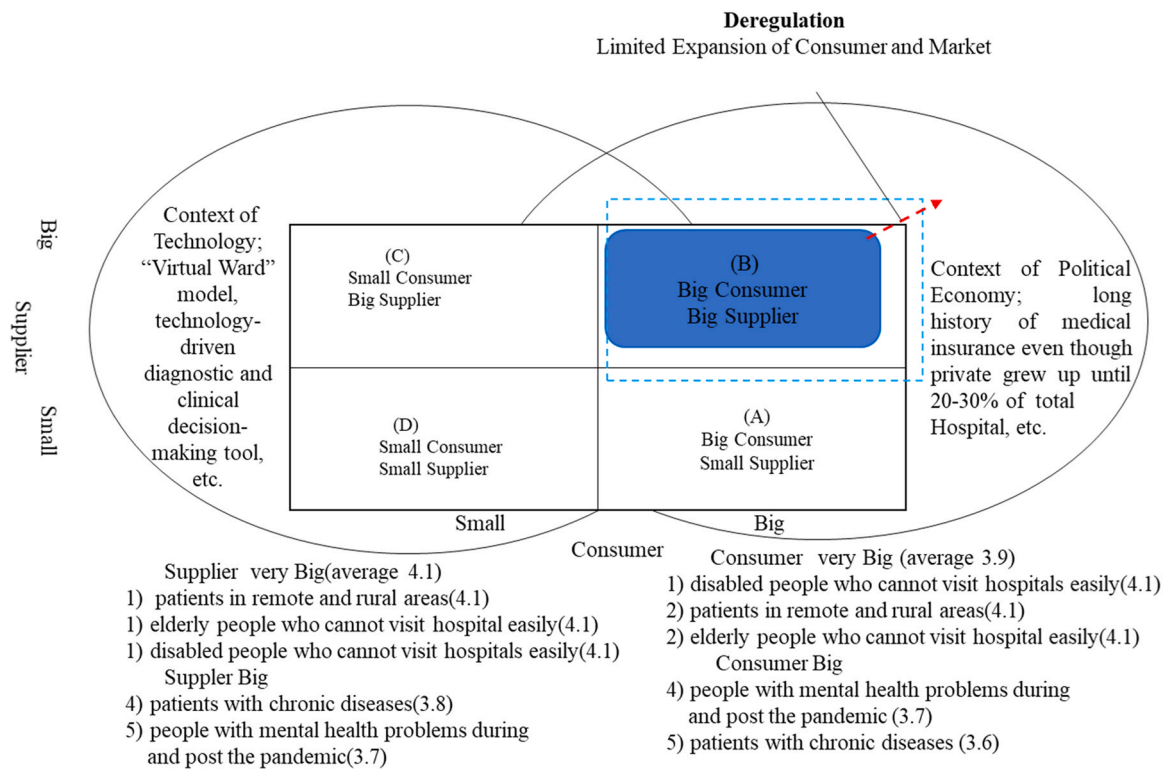


Fig. 4. The situation of telemedicine in the UK, including Cardiff, based on interviews with suppliers and consumers.

applied to most areas of patients.” Another consumer over 40-old-year pointed out, “The regulations must be there to protect the patient and patient choice.”

Additionally, the UK’s telemedicine consumers and suppliers criticized together about 1) the lack of medical service suppliers in the public healthcare system. One supplier said, “The homeless or National Health Service (NHS) service could be the victims of telemedicine if the telemedicine service is not expanded rationally.”

Comparing telemedicine between South Korea and the UK

A significant difference exists in the acceptance of telemedicine by consumers and suppliers together in South Korea and the UK, as shown in Table 3.

In the UK, consumer (3.6) and supplier (3.8) together require deregulation on telemedicine to expand the market for the following reasons: 1) the high acceptance level of telemedicine by suppliers and consumers; 2) the high requirement of redefinition on regulation conditions and scope from both suppliers and consumers; 3) considerably high acceptance of the benefits of telemedicine by suppliers and consumers in all areas; 4) considerably low negative perception on telemedicine from both consumer and supplier (Table 2).

Oppositely, the deregulation requirement for telemedicine is not so high among consumers (2.9), and suppliers (3.1) in Korea. By the way, Korea consumer (4.1), and supplier (3.5) together shows a requirement for regulation conversion to create the telemedicine industry like Table 2. The reasons for regulation conversion in telemedicine are as follows; 1) low acceptance of telemedicine by doctors, 2) the significant gap between supplier and consumer in regulation change requirement, 3) the small redefinition requirement of telemedicine in both, 4) low recognition of the benefits by supplier, and 5) high recognition of the cost of telemedicine by supplier.

Analyzing of for-profit-hospitals

For-profit-hospitals in South Korea

In the context of oligopoly, big hospitals such as Samsung, Hyundai, Korea University, and Severance, in the South Korean hospital industry are connected with the IT medical instrument and for-profit industries, with a substantial market size. Nevertheless, the interview results of doctors and customers of medical services show that for-profit-hospitals do not exist in South Korea like (D) in Figure 5. The illusion areas of consumer and supplier existence in for-profit-hospitals are from Daegu’s hospital sectoral innovation system in South Korea, as shown in Figure 5.

One doctor disagreed with for-profit-hospitals because they cannot combine the core values of hospitals. One doctor said, “Any medical service just for special class consumer targets could not be accepted.”

Doctors (2.3) and consumers (3.2) strongly disagree on establishing for-profit-hospital. The reasons may include 1) arrowing NHS hospitals to pursue profit, 2) increasing provision for profitable medical services, and 3) considering partially and conditionally abolishing the NHS registration system. One doctor claimed, “I could not agree with for-profit-hospitals and the diminishing of public medical insurance by for-profit-hospitals.” Another consumer proposed, “It is useless if we have to introduce for-profit-hospitals at the sacrifice of public medical insurance.”

In the case of regulation for for-profit-hospitals, the main customers include as following; 1) foreign visitors, 2) domestic customers who seek additional medical services, and 3) the limitation of the scale of private healthcare. There is insufficient agreement among doctors (3.1) and consumers (3.3). One doctor proposed that “for-profit-hospitals should be under limits, but the different treatment between domestic people and foreigners is not rational.” One consumer said, “Basically, I could not accept for-profit-hospitals, and the advantage to foreigners in for-profit-hospitals could not be accepted.”

South Korea’s doctors and consumers are worried about the negative effects of for-profit-hospital as follows. One doctor was worried that

Table 3
Average values of interviewees' answers on telemedicine from South Korea and the UK.

Category		South Korea, Daegu	Cardiff, UK	Explanation
Agreement on telemedicine	Consumer	4.0	3.9	Consumer agreement is high in both. High gap in suppliers between Korea and the UK
	Supplier	3.1	4.0	
Regulation change requirement	Consumer	4.1	3.9	High difference between consumer and supplier →Regulation conversion Korea: high difference UK: small difference
	Supplier	3.5	4.1	
Deregulation; regulation condition and scope redefinition requirement	Consumer	3.1	3.6	Deregulation requirement UK consumers and suppliers both high, Korea both not so high
	Supplier	2.9	3.8	
Beneficiaries and benefits of telemedicine regulation	Consumer	3.8	3.9	UK; consumer and supplier all very high in all 6 items Korea; is only consumer in only 3 items high
	Supplier	3.1	4.0	
Victims and cost-bearers of telemedicine regulation	Consumer	3.6	3.1	UK; consumers and suppliers very low in acceptance of telemedicine as the victims Korea; consumers and suppliers a slightly high in acceptance of telemedicine as victims
	Supplier	3.8	3.1	
Regulation change direction from interview results	Regulation conversion		Deregulation	Difference acceptance in consumers and suppliers of telemedicine → difference regulation change

*Values of 5 measures in the semi-structured questionnaire "1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree nor disagree, 4. Somewhat agree, 5. Strongly agree"

"The rich class could monopolize the high-end medical service." Another consumer over 40 years old specified, "The number of for-profit-hospitals, and the target of this service should be strictly limited by law."

In contrast, South Korea's doctors and consumers worried about the victims of for-profit-hospitals as follows: 1) the decrease of opportunity for NHS patients to receive the best medical service, 2) a lack of medical service suppliers in the public healthcare system, 3) the damaging of the reliability of the public health system. One doctor said, "The introduction of for-profit-hospitals will decrease the quality of medical service for the public." Another consumer said, "Though the benefits of for-profit-hospitals belong to a small group, the victims of for-profit-hospitals belong to all."

For-profit-hospitals in the UK

Regarding for-profit-hospitals in the UK, the situation is: 1) the coexistence of public and for-profit-hospitals for over 30 years, and 2) prompting a rapid shift toward digitized personalized medical care. The UK's medical service suppliers (3.7) are in high agreement with for-profit-hospitals like Figure 6. The UK's medical service consumers (3.6) have a medium to a high degree of agreement with for-profit-hospitals, as shown in Figure 6. One consumer under 40-year-old said, "Private healthcare policy should target those for whom the NHS has not been an option or whom the NHS has failed." Another medical service supplier in the UK pointed out that, "Private healthcare should only be for those who want it, not for everyone."

Suppliers and consumers in the UK strongly opposed the deregulation of for-profit-hospitals. The reasons are as follows: 1) allowing it to let NHS hospitals pursue profit, 2) allowing it to let increase the provision of profitable medical services and decrease services covered by the NHS, and 3) allowing it let partially and conditionally abolish the NHS registration system. Nevertheless, suppliers and consumers of the UK medical service agreed that private healthcare should prioritize domestic customers who seek additional medical services beyond the NHS. One consumer said, "Even though for-profit-hospitals are needed to promote better services and special treatment in the private sectors, regulations should also concern the prices of private healthcare service to avoid price competition and protect patients."

The UK's consumers (3.7) and suppliers (3.6) accepted as following as the benefits or beneficiaries of for-profit-hospitals; 1) foreign visitors, 2) local governments seeking to attract overseas consumers, 3) medical research institutions, and 4) increasing service choices for domestic customers. These are opposite to the results of South Korea. One medical service provider in the UK said, "NHS should still be the priority, rather than private healthcare service. The scope of for-profit-hospital should be for anything healthcare required beyond fundamental emergency treatment." Nonetheless, the UK's suppliers and consumers are worried slightly about the possibility of the victims of for-profit-hospitals. One consumer highlighted, "The beneficiaries will be individuals who do not want to wait for procedures via NHS."

From the interview results of the UK's medical service suppliers and consumers, the following can be seen: 1) positive attitudes toward the beneficiaries of for-profit-hospitals from both suppliers and consumers and 2) opposing the deregulation of for-profit-hospitals by suppliers and consumers. The regulation requirement of for-profit-hospitals in the UK to expand the market for for-profit-hospitals could be inferred. If the regulation conversion could defend the victims of the for-profit-hospitals in the UK, the market could be increased sufficiently by jointly meeting the expectations of suppliers and consumers. One medical doctor in the UK confessed that "if we do not pay attention to providing equitable services to all, the poorest will become more and more disadvantaged by for-profit-hospitals." Another young consumer said, "Not all people may be able to afford private healthcare, particularly the elderly or those who cannot work for some reason."

Comparing for-profit-hospitals in South Korea and the UK

Significant differences exist between the UK and South Korea in accepting for-profit-hospitals, as shown in Table 4. Consumer and supplier illusions from the aspect of the political economics and technology of South Korea could be identified from this interview-based research. South Korean consumers and suppliers generally do not accept for-profit-hospitals. Also, a vast gap exists between the victims and beneficiaries of for-profit-hospitals, which requires no policy intervention, owing to insufficient market growth and industry.

The UK's consumers and suppliers generally accept the value of for-profit-hospitals. They highly accept regulation on the domestic customers who seek additional medical services but do not accept deregulation on for-profit-hospitals. Additionally, the UK suppliers and

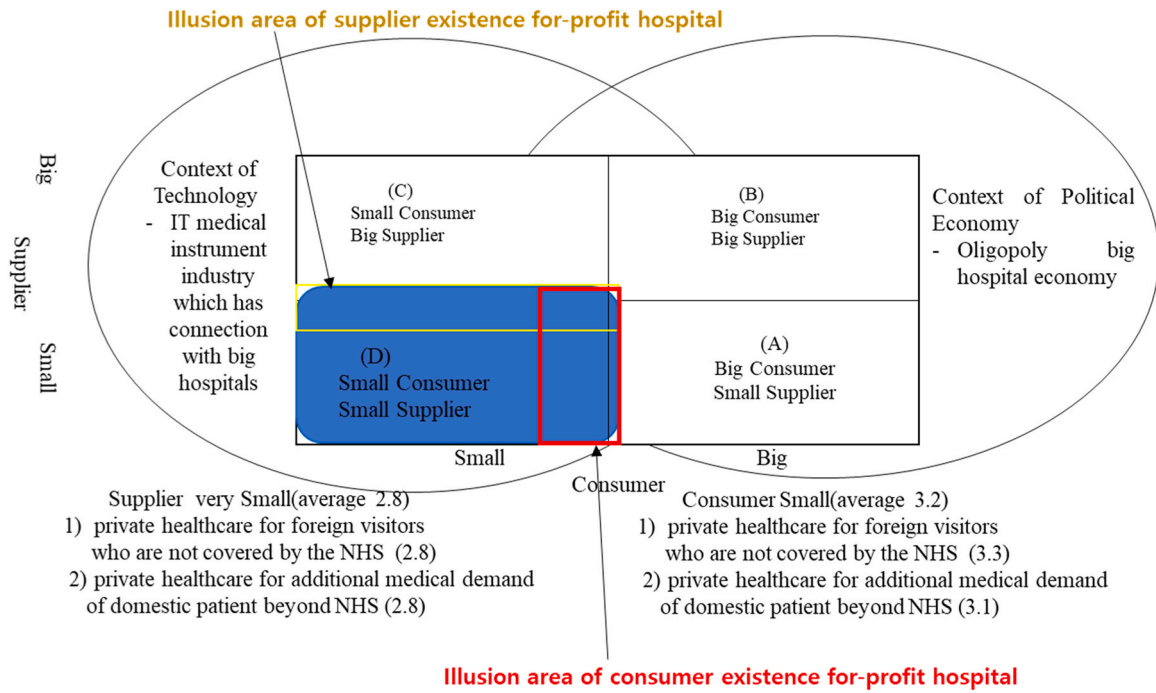


Fig. 5. The situation of for-profit-hospitals in South Korea based on interviews with suppliers and consumers.

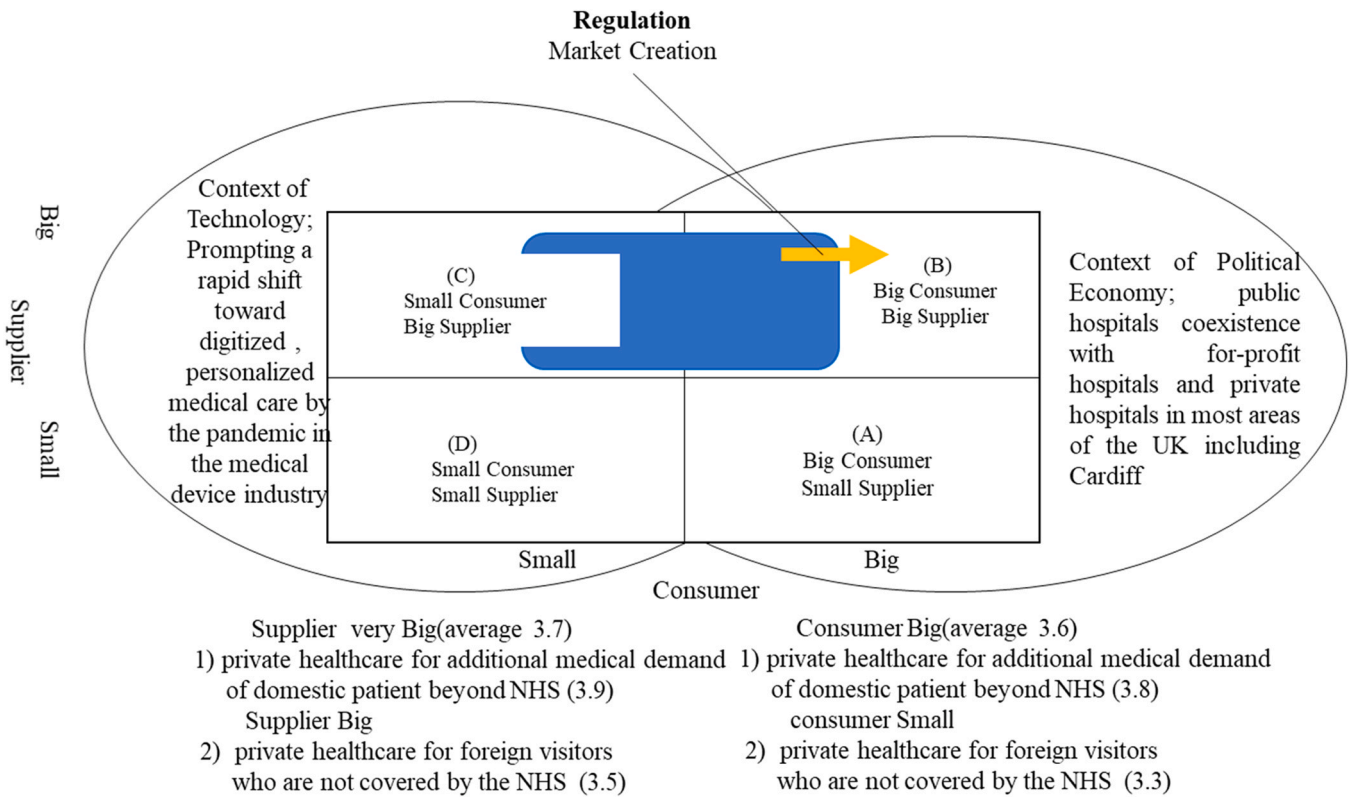


Fig. 6. The situation of for-profit-hospitals in the UK based on interviews with suppliers and consumers.

consumers show acceptance of beneficiaries and victims. This means that the regulation on for-profit-hospitals is needed in the UK to increase the market, while meeting the requirements of the UK's hospital sectoral innovation system.

Grounded theory: digital transformation motivates regulation conversion through open innovation

The open innovation dynamics are motivating regulation conversation in the converted new industry. Though closed innovation is based on the permission which comes with regulation, open innovation is

Table 4
Average values of interviewees' answers regarding for-profit-hospitals in South Korea and the UK.

Category		South Korea, Daegu	Cardiff, UK	Explanation
Agreement of for-profit-hospital	Consumer	3.2	3.5	The UK is higher than South Korea for both sides
	Supplier	2.8	3.7	
Regulation change requirement	Consumer	3.3	2.4	UK deregulation requirement No
	Supplier	3.1	2.6	
Deregulation requirement	Consumer	3.1	3.6*	South Korea, no interest
	Supplier	3.3	3.7*	
Regulation condition and Scope reregulation	Consumer	3.1	3.6*	UK domestic customers who seek additional medical services, high
	Supplier	3.3	3.7*	
Beneficiaries and benefits of for-profit-hospitals	Consumer	2.8	3.7	South Korea, totally low
	Supplier	3.1	3.6	
Victims and cost-bearers of for-profit-hospitals	Consumer	3.7	3.4	UK; consumer and supplier normally high
	Supplier	3.6	3.5	
Regulation change direction from interview results	Consumer	3.7	3.4	Korea; both very low
	Supplier	3.6	3.5	
				In the UK; both victims are smaller than the beneficiaries
				Korea; both victims are bigger than the beneficiaries
				UK regulation for market creation is required
				Korea has no need for policy for the illusion area of consumer and supplier

*Values of 5 measures in the semi-structured questionnaire "1. Strongly disagree, 2. Somewhat disagree, 3. Neither agree nor disagree, 4. Somewhat agree, 5. Strongly agree"

based on in-advance permission-less innovation, which comes with regulation conversion.

The traditional healthcare industry has been evolved as telemedicine industry and is being expanded explosively from the COVID –19 Pandemic with digital transformation. Digital transformation could trigger appearances of diverse converted new industries like telemedicine, car sharing, house sharing smart payment, smart delivery or

autonomous car industry through open innovation as in Figure 7 upper part. By the way, deregulation with closed innovation even under digital transformation could not create new industry but expand existing industry with deregulation most of matured industries like taxi, hotel, or automotive (below part in Figure 7).

Open innovation with digital transformation lead governments to regulation conversion, which converts regulations for the protection of traditional industries to create and increase IT based converted new industries.

Regulation conversion and deregulation have opposite effects on the markets, as shown in Table 5. Regulation conversation can trigger the construction of a converted new industry with the sacrifice of modern market agents. However, the prospects of a new industry with the evolution of the economy require the destruction and sacrifice of the modern market to escape the innovator's dilemma (Christensen, 2013). Thus, there are big differences in effects between regulation conversion, and deregulation.

Deregulation can expand the modern market much further with disturbing the emergence of new markets. Moreover, deregulation could reduce consumer surplus because regulation had been mainly prepared to protect consumers surplus from unexpected market risk.

Conclusion

Summary of research results and implication

The results of the online interviews on telemedicine and for-profit-hospital at Daegu-Gyeongbuk province in South Korea, and Cardiff Wales in the UK show different results according to the maturity of consuming and supplying conditions of target industries like Figure 8.

There are three practical implications. First, we need to deeply look into target markets to find out the existence of customers and suppliers because the illusions of consumers and suppliers like Korean case in Figure 5 could encourage unnecessary policies to establish any industry or market, Second, South Korea does not need deregulation but regulation conversion to create a telemedicine industry. Deregulation for

Table 5
Comparing regulation conversion and deregulation.

Contents	Reregulation Conversion	Deregulation
Goal	Constructing New Industry	Maximizing the modern market with the sacrifice of new industry and consumer surplus.
Effects	Emerging and Growing up of converted new market with the decrease of modern market	Short term growing up of modern market with the delay of growing of new market

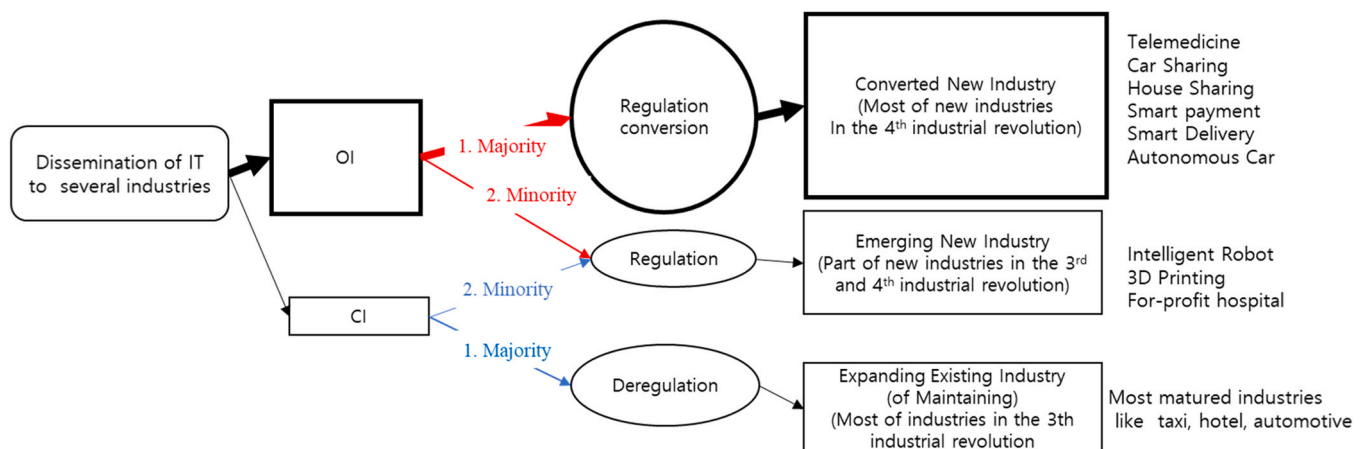


Fig. 7. Process logic from digital transformation to regulation conversion.

Daegu-Gyeongsang South Korea	<p>Regulation Conversion To supply enough medical IT instrument</p>	<p>No customer requirement with illusion area of consumer</p> <p>No supplier requirement with illusion area of supplier</p>
Cardiff Wales United Kingdom	<p>Deregulation To expand the existing market and increase industry a little more</p>	<p>Regulation To create enough market by providing safety guidance to protect potential customers</p>
	Telemedicine	For-Profit-Hospital

Fig. 8. Summary of research results.

building the Telemedicine industry in South Korea could destroy the seed of the new converted industry. Third, the deregulation needs to expand existing market like the telemedicine market in the UK to take a global competitive advantage.

There are three theoretical implications. First, this study theoretically found that the way to create a converted new industry is not deregulation but regulation conversion. Second, regulation can be an essential policy method to create markets when there are enough (potential) suppliers owing to technological developments or the accumulation of a new workforce equipped with new technologies. Third, open innovation can meet converted new industries as the accelerating engine in the digital transformation. The expanded open innovation dynamics with digital transformation can promote the appearance of open business models for converted new industries.

Future research areas

This study requires follow-up researches as following to advance the grounded theories further.

First, comparative studies on the telemedicine industry under diverse sectoral innovation systems or regional innovation systems in different situations of the capitalist economy are needed. Second, social experiments to compare the policy effects among deregulation, regulation, and regulation conversion according to the context of the belonging sectoral innovation system or technological innovation system are required. There are too many misunderstandings about regulation or deregulation. International comparative social experiments on the same sector with different policies will be helpful to enrich the value of regulation or regulation conversion.

Ethical statement

This research project on ‘Comparative studies on the telemedicine and for-profit hospital system in UK and South Korea’ has been approved by the Cardiff School of Management Research Ethics Committee, Cardiff Metropolitan University in Sep 2021. The ethics approval code is 2021DE0003.

CRedit authorship contribution statement

JinHyo Joseph Yun; He made the research framework, did online interview of Korean cases, analysed Korean and Wales cases, and wrote the full paper. **Xiaofei Zhao;** She did online interview of Korean cases with professor Yun, and joined to analyse of Korean and Wales cases. **Zheng Liu;** She did online interview of Wales cases, analysed the 1st time the Wales cases, helped professor Yun to analyse finally Korean and Wales cases.

Declaration of Competing Interest

The authors declare no conflict of interest.

Acknowledgement

This work was supported by the DGIST R&D Program of the Ministry of Science and ICT (24-IT-03).

All authors thank to all interviewees in UK and South Korea who voluntarily joined our interview process. Additionally, they thank to Professor Hangsik Park from Eulji university in South Korea, professor Yang Bo from Swansea university in Wales, UK, and professor Kwangho Jung at Seoul National University in South Korea about helping them in the process of field researches for this study. In addition, all authors thank to Professor Ulrich Witt from Jena university in German, and professor Philip Cooke in Bergen university for them gave a lot of valuable comments on this paper at society of Open Innovation; Technology, Market, and Complexity conference in 2022. Corresponding author Professor Yun announced that Professor Xiaofei Zhao, and Zheng Liu did the role of co-corresponding authors by actively joining in interview, and analyzing interview results together with him.

Appendix 1. Semi-structured questionnaire for interview and survey

1. Policy target
 - 1-1. Telemedicine
 - 1-1-1. Telemedicine policy should target patients with chronic diseases (e.g., high blood pressure, diabetes, asthma, heart diseases).
 - 1-1-2. Telemedicine policy should target patients in remote and rural areas.
 - 1-1-3. Telemedicine policy should target older adults who cannot visit hospitals easily.
 - 1-1-4. Telemedicine policy should target disabled people who cannot visit hospitals easily.
 - 1-1-5. Telemedicine policy should target people with mental health problems during and post the pandemic.
Who else should the telemedicine policy target/consider?
 - 1-2. For-Profit-Hospital
 - 1-2-1. Private healthcare policy should target foreign visitors who are not covered by the NHS.
 - 1-2-2. Private healthcare policy should focus on additional medical demand beyond the NHS.
Who else should the private healthcare policy target/consider?
2. Regulation change (regulation establishment, deregulation, and conversion)
 - 2-1. Requirements for establishing telemedicine
 - 2-1-1. Legislation for remote medical monitoring (e.g., monitoring patients’ blood pressure and weight scale) is needed for establishing telemedicine.
 - 2-1-2. Legislation for remote medical treatments is needed for establishing telemedicine.
 - 2-1-3. Legislation for the qualification and responsibilities for providing remote medical assistance is needed for establishing telemedicine.
 - 2-1-4. Legislation for medical insurance is needed for establishing telemedicine.
Are there any other regulation requirements for establishing telemedicine?
 - 2-2. Regulation requirements for establishing for-profit-hospitals
 - 2-2-1. To promote private healthcare, there should be legislation allowing NHS hospitals to pursue profit.
 - 2-2-2. To promote private healthcare, legislation should increase the provision of profitable medical services and decrease the services covered by the NHS.

2–2–3. To promote private healthcare, legislation should consider partially and conditionally abolishing the NHS registration system.

What else should legislation consider to promote private healthcare?

3. Regulation performing conditions and scope

3–1. Regulation performing conditions and scope toward telemedicine.

3–1–1. Telemedicine services should prioritize certain geographic areas (islands or rural areas with limited hospital access)

3–1–2. Telemedicine services should prioritize specific healthcare institutions (e.g., primary healthcare sectors/GPs).

3–1–3. Telemedicine services should prioritize people with special needs (older adults, disabled).

3–1–4. Telemedicine services should prioritize people with mental health problems during and post the pandemic

Should telemedicine be applied to any specific institutions/customers in your opinion?

3–2. Regulation performing conditions and scope toward for-profit-hospitals

3–2–1. Private healthcare should prioritize foreign visitors who are not covered by the NHS.

3–2–2. Private healthcare should prioritize domestic customers who seek additional medical services beyond the NHS.

3–2–3. There should be a limitation on the scale of private healthcare, e.g., the capacity (number of beds) of private hospitals. Any additional comments on the scope of private healthcare?

4. Beneficiaries and benefits of regulation

4–1. Beneficiaries and benefits of telemedicine regulation

4–1–1. Older adults and disabled people who have difficulty accessing hospitals can benefit from telemedicine regulations.

4–1–2. Patients in remote and rural areas can benefit from telemedicine regulations.

4–1–3. Patients with chronic diseases can benefit from telemedicine regulations.

4–1–4. Patients with mental health problems can benefit from telemedicine regulations.

4–1–5. Primary healthcare providers (e.g., GPs) can benefit from telemedicine.

4–1–6. Secondary or tertiary healthcare providers (e.g., hospitals, specialists) can benefit from telemedicine regulations.

Who else can benefit from telemedicine regulations?

4.2. Beneficiaries and benefits of for-profit-hospital regulation

4–2–1. Foreign visitors who seek high-quality healthcare can benefit from private healthcare regulations.

4–2–2. Local government seeking to attract overseas visitors/customers can benefit from private healthcare regulations.

4–2–3. Medical research institutions can benefit from private healthcare regulations.

4–2–4. Private healthcare regulations can provide more service choices for domestic customers.

Who else can benefit from private healthcare regulations?

5. Victims and cost-bearers of regulation

5–1. Victims and cost-bearers of telemedicine regulation

5–1–1. Healthcare providers not using telemedicine services cannot benefit from telemedicine regulations.

5–1–2. Small and medium-sized hospitals with insufficient financial resources to provide telemedicine services cannot benefit from telemedicine regulations.

5–1–3. Patients who cannot receive complete treatment via telemedicine services cannot benefit from telemedicine regulations.

Who else cannot benefit from telemedicine regulations?

5–2. Victims and cost-bearers of for-profit-hospital regulation

5.2.1. NHS patients are unable to receive the best medical services owing to excellent medical personnel moving to the private healthcare sector.

5.2.2. With doctors moving from public to private healthcare institutions, there will be a lack of medical service suppliers in the public healthcare system.

5.2.3. The Establishment of private healthcare can damage the reliability of the public health system.

What are the other negative effects of private healthcare regulations?

References

- Abu-Naser, S.S., Al-Dahdooh, R., Mushtaha, A., & El-Naffar, M. (2010). Knowledge management in ESMDA: expert system for medical diagnostic assistance.
- Acemoglu, D., Robinson, J., 2008. The role of institutions in growth and development, Vol. 10. World Bank, Washington DC.
- Akerlof, G.A., Shiller, R.J., 2010. Animal spirits: how human psychology drives the economy, and why it matters for global capitalism. Princeton university press.
- Bailey, E.E., Baumol, W.J., 1983. Deregulation and the theory of contestable markets. *Yale J. Reg.* 1, 111.
- Becker, G.S., 1983. A theory of competition among pressure groups for political influence. *Q. J. Econ.* 98 (3), 371–400.
- Bergek, A., Hekkert, M., Jacobsson, S., Markard, J., Sandén, B., Truffer, B., 2015. Technological innovation systems in contexts: conceptualizing contextual structures and interaction dynamics. *Environ. Innov. Soc. Transit.* 16, 51–64.
- Carter, Z.D., 2021. The price of peace: money, democracy, and the life of John Maynard Keynes. Random House Trade Paperbacks.
- Charmaz, K., 2014. Constructing grounded theory. sage.
- Chesbrough, H., Van Alstyne, M., 2015. Permissionless innovation. *Commun. ACM* 58 (8), 24–26.
- Chesbrough, H.W., 2003. Open innovation: the new imperative for creating and profiting from technology. Harvard Business Press.
- Christensen, C.M., 2013. The innovator's dilemma: when new technologies cause great firms to fail. Harvard Business Review Press.
- Cooke, P., 2001. Regional innovation systems, clusters, and the knowledge economy. *Ind. Corp. Change* 10 (4), 945–974.
- Cooke, P., 2005. Regionally asymmetric knowledge capabilities and open innovation: Exploring 'Globalisation 2'—a new model of industry organisation. *Res. Policy* 34 (8), 1128–1149.
- Dorsey, E.R., Topol, E.J., 2020. Telemedicine 2020 and the next decade. *lancet* 395 (10227), 859.
- Dosi, G., Nelson, R.R., 2010. Technical change and industrial dynamics as evolutionary processes. *Handb. Econ. Innov.* 1, 51–127.
- Flick, U., 2021. Doing interview research: the essential how to guide. *Doing Interview. Research* 1–100.
- Glaser, B., Strauss, A., 2017. Discovery of grounded theory: strategies for qualitative research. Routledge.
- Gobble, M.M., 2015. Regulating innovation in the new economy. *Res. Technol. Manag.* 58 (2), 62–67.
- Hayek, F.A., 1943. The road to serfdom. Psychology Press.
- Keynes, J.M., 1936. The general theory of employment, interest, and money. Cambridge University Press.
- Kotler, P., 2015. Confronting capitalism: real solutions for a troubled economic system. Amacom.
- Lee, M., Yun, J.J., Pyka, A., Won, D., Kodama, F., Schiuma, G., Park, H., Jeon, J., Park, K., Jung, K., 2018. How to respond to the fourth industrial revolution, or the second information technology revolution? Dynamic new combinations between technology, market, and society through open innovation. *J. Open Innov.: Technol., Mark., Complex.* 4 (3), 21.
- Liu, Z., Shi, Y., Yang, B., 2022. Open innovation in times of crisis: an overview of the healthcare sector in response to the COVID-19 pandemic. *J. Open Innov.: Technol., Mark., Complex.* 8 (1), 21.
- Lyuboslavsky, V., 2015. Telemedicine and telehealth 2.0: a practical guide for medical providers and patients. CreateSpace Independent Publishing.
- Mair, J., Marti, I., 2009. Entrepreneurship in and around institutional voids: A case study from Bangladesh. *J. Bus. Ventur.* 24 (5), 419–435.
- March, J.G., Simon, H.A., 1993. Organizations. John Wiley & sons.
- McGee, M., Potter, C., Kane, J., 2020. Are UK care homes ready for the telemedicine revolution? *BJPsych Bull.* 44 (5), 222–222.
- Picone, G., Chou, S.-Y., Sloan, F., 2002. Are for-profit hospital conversions harmful to patients and to Medicare? *RAND J. Econ.* 507–523.
- Portnoy, J., Waller, M., Elliott, T., 2020. Telemedicine in the era of COVID-19. *The J. Allergy Clin. Immunol.: Pract.* 8 (5), 1489–1491.
- Posner, R.A., 1971. Taxation by regulation. *Bell J. Econ. Manag. Sci.* 22–50.
- Posner, R.A., 1974. *Theor. Econ. Regul.* (0898-2937).
- Puffer, S.M., McCarthy, D.J., Boisot, M.J.E. t, practice, 2010. *Entrep. Russ. China.: Impact Form. Inst. voids* 34 (3), 441–467.
- Schumpeter, J., 1934. The theory of economic development. Joseph Alois Schumpeter. Springer, pp. 61–116.
- Schumpeter, J.A., 1942. Capitalism, socialism and democracy. routledge.
- Stephan, U., Uhlaner, L.M., Stride, C., 2015. Institutions and social entrepreneurship: the role of institutional voids, institutional support, and institutional configurations. *J. Int. Bus. Stud.* 46, 308–331.
- Stigler, G.J., 1971. The theory of economic regulation. *Bell J. Econ. Manag. Sci.* 3–21.

- Sunstein, C.R.J.T.U. o C.L.R., 1990. Paradox--. Regul. State 57 (2), 407–441.
- Thierer, A., 2014. Embracing a culture of permissionless innovation. Cato Online Forum.
- Thierer, A., 2016. Permissionless innovation: The continuing case for comprehensive technological freedom. Mercatus Center at George Mason University.
- Thierer, A.D., Camp, J., 2017. Permissionless innovation and immersive technology: public policy for virtual and augmented reality. Mercat. Res. Pap.
- Topol, E., 2015. The patient will see you now: the future of medicine is in your hands. Basic Books.
- Winston, C., 1993. Economic deregulation: Days of reckoning for microeconomists. J. Econ. Lit. 31 (3), 1263–1289.
- Winston, C., 1998. US industry adjustment to economic deregulation. J. Econ. Perspect. 12 (3), 89–110.
- Yun, J.J., Park, K., Hahm, S.D., Kim, D., 2019a. Basic income with high open innovation dynamics: The way to the entrepreneurial state. Journal of Open Innovation: Technology, Market, and Complexity 5 (3), 41.
- Yun, J.J., Won, D., Park, K., Jeong, E., Zhao, X., 2019. The role of a business model in market growth: The difference between the converted industry and the emerging industry. Technol. Forecast. Soc. Change 146, 534–562.

JinHyo Joseph Yun: He founded Journal of Open Innovation: Technology, Market, and Complexity(JOIn) on 2014 after long time preparation from 2005. He is now the Editor-In-Chief of JOIn, and have published more than 100 peer reviewed papers and 10 books in English, and Korean on micro and macro open innovation dynamics, and open business model.

Xiaofei Zhao: She is the tenured senior researcher in DGIST, South Korea. She is also serving as the associate-assistant editor of Journal of Open Innovation: Technology, Market, and Complexity. She had published more than 10 papers with Professor Yun in the field of open innovation and business model.

Zheng Liu (PhD) is an Associate Professor at Greenwich Business School in the University of Greenwich. Her research focuses on supply chain sustainability, circular economy, and innovation ecosystem.