

Special Issue Title; SOItmC 2019 special issue

- Second IT revolution and Dynamic Open Innovation;
From Smart City, Autonomous Car, Intelligent Robot, and Block
Chain to Sharing Economy.

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Interest

Papers which were recommended at JOItmC special issue of SOItmC 2019 can be recommended at **Best Paper Award of SOItmC 2019**.

And the publishing fees of 11 keynote speech papers + 4 special papers will be paid by DGIST.

➔ Please add Acknowledgement one of followings threes.

- (1) “This paper was supported by DGIST in the publishing fee (DGIST-IT-19-01)
- (2) “This paper was presented as keynote speech of SOItmC 2018, and was supported by DGIST in the publishing fee by DGIST”. (DGIST-IT-19-01))

Keywords

(Subject Coverage)

Suitable topics include but are not limited to:

- Dynamic Open Innovation
- Business Model
- Schumpeterian Economics
- Smart City
- Autonomous Car
- Intelligent Robot
- Block Chain
- Sharing Economy
- 2nd IT revolution or 4th industrial revolution
- Complexity

Publishing Plan

JOItmC special issue will publish 60-70 papers among 100s SOItmC 2019 papers which consist of 11 keynote papers, 80s special issue papers, and 20s general issue papers.

Summary;

Special Issue Papers from 11 Keynote Speakers

No.	Paper Title	Authors(* corresponding Author)	First or Corresponding Author
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2	Transition of Innovation in the Japanese Automobile Industry	Yuri Sadoi	
3	Changing Global Landscape: Global Challenges and Opportunities for Innovation	Levent Altinay	
4	Proximity, Networks and Clusters in the Quaternary (4.0)	Philip Cooke	

	Economy: New Asymmetries		
5	The Way to Entrepreneurial State: Sustainable Dynamics of Open Innovation with Basic Income, Permission-less Innovation, High Capital Fluidity, and Sharing Economy	JinHyo Joseph Yun	
6	How are Demand and Feasibility of Connectivity articulated?	Fumio Kodama	
7	IOT to IOTTF: Internet of Things, to the Internet of Things, Thoughts and Feeling for a Caring and Sharing Economy	Anil K. Gupta	
8	From Smart to Post-Anthropocentric Cities	Tan Yigitcanlar	
9	Circular Economy in India	Venni V Krishna	
10	Productivity Slowdown or Transformation towards Sustainability?	Andreas Pyka	
11	Geographies of Disruption and Spatialities of Knowledge	Tommi Inkinen	

80 Special Issue Papers

Which were recommended from SOItmC 2019 at JOItmC special issue with the possibility of "Best Paper Award".

No.	Paper Title	Authors(* corresponding Author)	First or Corresponding Author
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1	Effects and Responses of Taiwan-Japan Industry Cooperation Policy in Tokai Region, Japan	Kuan-Ju Lin, Yahn-Shir Chen	Kuan-Ju Lin
2	Impact of Social Robots on Society and Economy in Japan	SHAPOSHNIKOV Sergei	SHAPOSHNIKOV Sergei
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4	Sharing What Is Learned from Outside Industrial Training with Organizational Peers	Yoshi Takahashi, Than Than Aung* & Mon Mon Oo & Nu Nu Mai	Than Than Aung*
5	The Suggestion of the Toyota production system using IoE by JTEKT	Yusuke Tanaka	Yusuke Tanaka
6	Challenges of Governmental Policy Changes In Myanmar Higher Education Development	Ye Tun Min	Ye Tun Min
7	Open Innovation culture and Its' Cycle	Xiaofei Zhao, JinHyo Joseph Yun*	Xiaofei Zhao
8	Graduates' career choice towards social enterprises and NPOs	Jingjing WENG*, Frances Wu	Jingjing WENG*
9	The study of social entrepreneurial teams	Li-Chun KUNG, Ying-Che HSIEH*	Ying-Che HSIEH*
10	Research on the Process of Resource Bricolage and Organizing Improvisation in IT Innovation: A Case Study of Baida Zhongxing	Haibo Hu, Haitao Lu, Chunbing Mao, Meiju Fei, Yang Cheng*	Yang Cheng*

11	Research on Regional Collaborative Innovation Platform Based on platform theory——With Nanning high tech Industrial Development Zone	Xiaojing Huang	Xiaojing Huang
12	What Dynamic Managerial Capabilities Are Needed for Greater Strategic Alliance Performance in IT Industry?	Čirjevskis, Andrejs & Felker, Yves M.	Čirjevskis, Andrejs
13	Digital Maturity and Corporate Performance: Case of Baltic States	Eremina, Yulia; Lace, Natalja*, Bistrova, Julija	Lace, Natalja*
14	Open innovation and simulation in life-science startups	Udo Mueller, Bernd Ebersberger	Udo Mueller
15	The future of AI in Europe: learning from China towards mission-oriented social innovation strategies	Claudio Feijoo & Gianluca Misuraca	Claudio Feijoo
16	Study on the business model of post-natal nursing institutions in Taiwan and China	Min-Ren Yan, Pei-ling Liu*	Pei-ling Liu*
17	How Social Innovation Creates Shared Value for Sustainable Community Development: The Case of Kaohsiung Arena	Min-Ren Yan, Lin-Ya Hong, Hui-Lan Chi, Ray-Yin Kuo	Min-Ren Yan
18	Research on Evolution and Consisting of Platform Business Model based on Structured User Resource	Li Kun	Li Kun

19	A study for skin analysis via cloud service to construct innovation models and aboard using system dynamics	Min-Ren Yan, Hsien-Jung Lee*	Hsien-Jung Lee*
20	Exploring innovation ecosystem from the perspective of sustainability: towards a conceptual framework	Zheng Liu, & Victoria Stephens	Zheng Liu
21	The change of China government's role in the development of government WeChat: Case study of NanJing city	Sun Ying	Sun Ying
22	Development of education model for improving collaboration creativity-Based on the online learning system (Moodle)	Eun-Joo Kim, Hang-Sik Park*	Hang-Sik Park*
23	The Study on the Esthetic Education as a Welfare Service in Korea for the Improvement of the Elderly's Happiness Index	Kyu-Ok Shin, Na- Gyeong Yeom, Hang-Sik Park*	Hang-Sik Park*
24	Digital Innovation adoption & its economic impact	HyunJee Park, SangOk Choi	HyunJee Park
25	Social-oriented cooperation program Development of economic and social effect measurement model	DaeGeon Kim, SeungHoo jin, GyeongMin Nam, SangOk Choi	DaeGeon Kim
26	International innovation collaboration in China	Kaihua Chen, Ze Feng, Xiaolan Fu*	Xiaolan Fu*

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27	Beijing as a Regional Innovation System: a case study of the ICT and software industries	Meijiao Huang, Geon-Cheol Shin, Antonio K.W. Lau*	Antonio K.W. Lau*
28	Managerial compensation and environmental innovation	Chang, Ching-Hsing	Chang, Ching-Hsing
29	The study on the effect of patent retrieval behavior on market awareness of teachers in the technical and vocational colleges and universities	Lo, Chih-Cheng*; Claire, Wang; Peng, Hsiao-Yun	Lo, Chih-Cheng*
30	Artificial Intelligence Road Survey System for detecting Road Defects	Seungki Ryu, Chanjun Chun	Seungki Ryu
31	A Study on the Inequity Between the Housing Location and the Commuting Accessibility in the Socially Vulnerable Classes	Seongman Jang& Changhyo Yi*	Changhyo Yi*
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33	The components and operative mechanism of entrepreneurial ecosystem dominated by core firm: Evidences from characteristic town in China	Guopeng Xiang*, ongshi Zhou	Guopeng Xiang*
34	A Study on the Improvement of Operational Efficiency of Public R&D Management	Byung Yong Hwang*, Eun Song Bae, Heung	Byung Yong Hwang*

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35	Efficiency Analysis of R&D Investment for SMEs by Ministries of Korea by Public Agencies (in Korea)	Eun-song Bae, Sung-Hun Park, Joong-Hun Ko, Dae Cheol Kim*	Dae Cheol Kim*
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37	Public Service Design Strategy based on Open Innovation Platform: Focusing on the Citizen-sympathetic Bus Stop Development Project of Jeju Special Self-Governing Province	Youngok Jeon* & Sinae Jung	Youngok Jeon*
38	Is Korea building a sustainable innovation system?	Kisoon Shin; Eungdo Kim*; Kwangsoo Shin	Eungdo Kim*
39	The impact of open innovation on patent registration fees	EuiSeob Jeong; SangWoo Kim	EuiSeob Jeong
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48	Effect analysis of short-term entrepreneurship education program: Focusing on moderate effects of Kolb's learning style	Chung-Gyu Byun, Chang Soo Sung	Chung-Gyu Byun
49	The Effect of Equity-based Crowdfunding Investment on the Corporate Management Performance and Job Creation	Hanjun Cho, Chang Soo Sung & Joo Y. Park	Hanjun Cho
50	The Impact of Multimarket Competition on Innovation Strategy: A Case Study of the Korean Game Companies in Japan and China	Jinju Lee, Deahyung Im	Jinju Lee

51	Samsung Electronics' Transition in M&A Strategy and its Implication through Harman International Cases	Jung Hyun Kim, Duong Thi Hong Nhung, Jeonghwan Lee*	Jeonghwan Lee*
52	Multiplier technology factors and technological DNA	Sunghoon Chung, Junghee Han	Sunghoon Chung
53	Does the Patent become a proxy of the firm's market value?Case of South Korea	JangHyeon Baek, Junghee Han	JangHyeon Baek
54	A Study on the Effect of Using Innovation Methodology on Innovation DNA Development and Corporate Performance	Dae-youn Hwang, Yeong-wha Sawng* & Sun-Young Park	Yeong-wha Sawng*
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58	How does characteristics of target's knowledge-base affect to technological innovation performance of acquirer? A case of biopharmaceutical	Kwangsoo Shin; Eungdo Kim*	Eungdo Kim*

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62	Factor Analysis affecting Outbound Open Innovation Performance in Bio-Pharmaceutical Industry - Revolving around out-Licensing Deals	Ingyu Lee; Kwangsoo Shin; Eungdo Kim*	Eungdo Kim*
63	- Development of rNPV(risk-adjusted Net Present Value) Technology Valuation Improvement model in Bio-Pharmaceutical Industry	Jonghak Woo; Eungdo Kim*, Tae- Eung Sung, Jongtack, Lee, Kwangsoo Shin & Jeonghee, Lee	Eungdo Kim*
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66	Linking Research and Education in Undergraduate School	Heungju Ahn	Heungju Ahn
67	The Effect of Design Competence on Science Education	Jong Rae Park	Jong Rae Park
68	The efficient collaboration strategy of US Pharmaceutical Companies in regional innovation system	Hana Kim; Hongbum Kim, Eungdo Kim*	Eungdo Kim*
69	The impact of social capital on US pharmaceutical innovation cluster performance	Hana Kim; Hongbum Kim, Eungdo Kim*	Eungdo Kim*
70	How can governments facilitate growth in the private sector? An empirical study of government support and firms' innovation performance in Korea	Sung-Bou Kim, Eunhyung Park, Dongwook Kim	Sung-Bou Kim
71	Detecting themes of public concern: focus on immigration policy by text mining analysis	Jung Chul Lee, Dongwook Kim, Hanbyul Choi, Eunmi Lee*	Eunmi Lee*
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75	Green governance: connotation and block chain based implementation	Runhui Lin*, Yuan Gui, Lun Wang, Biting Li	Runhui Lin*
76	Bank governance , media coverage and green loans	Lidong Wu*, Yana Zhou	Lidong Wu*
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78	The AI integrated AR training mode of Semiconductor industry- by hotel conference and exhibition	Chi-Hsuan Lin, Wei-Chuan Wang, Yung-Chang Pao*	Yung-Chang Pao*
79	Construction of AI model of trust fund raising—to hotel industry as the raising of mark	Wei-Chuan Wang, Chi-Hsuan Lin, Chi Chen Tsai*	Chi Chen Tsai*
80	Sustainability and Continuous Improvement of Organization: Review of Process-Oriented Performance Indicators	Aija Medne*, Inga Lapina	Aija Medne*

80 Special Issue Papers Expanded Abstracts

1.

Effects and Responses of Taiwan-Japan Industry Cooperation Policy in Tokai Region, Japan

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Aletheia University)

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of Science and Technology)

Abstract

To facilitate the industrial cooperation and communication between Taiwan and Japan, Taiwan initiated an “Industrial Cooperation Bridging Plan between Taiwan and Japan” in November 2011. To respond to Taiwanese “Industrial Cooperation Bridging Plan between Taiwan and Japan”, Japan signed a memorandum of understanding with Taiwan in November 2012. After the Tohoku massive earthquake on 11 March 2011, government officers from five prefectures in the Tokai Region visited Taiwan. They actively communicated and cooperated

with Taiwan government, resulting in an increasingly warm and friendly cooperation and communication between Taiwan and Japan. This also increases the researches about Taiwan-Japan industrial cooperation.

However, few researches investigate the effects of Taiwan-Japan industrial cooperation policy on Japanese government and enterprises in terms of Japan viewpoint. Hence, this study examines the effects and responses of Taiwan-Japan industry cooperation policy in Japanese Tokai region. First, this study inquiries into the economic and trade ties between the five Japanese local governments and Taiwan. Then, the status quo of the five counties in promoting Taiwan-Japan industrial cooperation policy is addressed. The viewpoints and responding measures taken by the five prefectures in Japanese Tokai region are investigated and compared. In final, this study summarizes the results from the investigations and analyses above. This study suggests some subjects and responding measures for the government and enterprises in Taiwan and Japan in the development of Taiwan-Japan industrial cooperation. This study also contributes knowledge to the literature on Taiwan-Japan industrial cooperation.

In 2011 Taiwan and Japan initiated an industrial cooperation policy. Afterward, the relevant units of Taiwan government have actively engaged in communication and propaganda with Japanese local governments. The ultimate goal of all this work is to let the Japan local governments establish a Taiwan-based office so as to increase have substantial collaboration and interaction between Japan and Taiwan. In addition to its economic strength, Tokai Region's current industrial structure is similar to that of Taiwan. I therefore choose Tokai Region as a representative local government of Japan for exploring the influence of the industrial cooperation policy between Taiwan and Japan. In this study I investigate the trade relations between Tokai Region and Taiwan and how they have been influenced by the Japan-Taiwan industrial cooperation policy. Lastly, I make proposals for the future development of this industrial cooperation.

In addition to the collection and analyses of prior literature, this study conducts questionnaire survey and enterprises visit to gather the newest information and viewpoints. This study examines the validity of related researches through the multiple methods, improving the appropriateness and literature contribution.

The results of this study show that Shizuoka Prefecture and Mie Prefecture have

significant performance in promoting the Taiwan-Japan industry cooperation policy due to the strong support from local government. The Aichi Prefecture, Gifu Prefecture, and Nagano Prefecture, however, have less policy support and thus less performance. In addition, the five Prefectures have immaterial differences in the influences and viewpoints of Taiwan-Japan industry cooperation policy. In conclusion, the promotion of industrial cooperation policy by Taiwan and Japan creates positive incentives for industries and enterprises and brings about a win-win situation. Therefore, the industrial cooperation between Taiwan and Japan is a forward-looking policy and deserves further promotion.

Keywords: Tokai Region, Industrial Cooperation, Taiwan-Japan Economic and Trade ,Taiwan

2.

Impact of Social Robots on Society and Economy in Japan

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Roots of Japanese robotics come from post-Second World War period when government decided to settle the country's economy and embarked on the path of «peaceful» growth. Development of new technologies and potential of «know-how» was actively used for the solution of acute problems. Having concentrated all efforts on the modernization of high-tech areas, Japan has embarked on the path of becoming a leader in robotics, science, engineering, and along with this began actively develop new technologies.

Japanese technological companies develop new types of robots that are able to interact with human on a social level. The result of the developments in this industry was the creation of social robots and the emergence of a new interdisciplinary area as «social robotics». Nowadays in Japan social robots occupy an important position in social and economic life.

Today Japan has difficult situation with aging of population and low level of labor productivity, at the same time Japan possess the largest stock of robots in operation in the field of production and service, hence, Japanese government set a plan to increase the usage of social robots in non-production sector.

Japan as a country of advanced technologies is already on its way to active introduction of social robotics into different spheres of human's life, however, it remains unexplored the question of social and economic impact.

Research question: The aim of research is to identify the role of social robots within Japanese society and understand the attitude of Japanese people toward social robots, and consider the place of social robots in economy. Also the paper aims to evaluate of the impact of social robots on economic situation in Japan.

Literature reviews: main sources include official documents of Government of Japan or government related organizations, results of researchers' experiments and results of survey.

Main documents analyzed in research are: «Innovation 25 Strategy Council» (2007) by Government of Japan and Council for Science and Technology Policy, «Science and Technology Basic Law» (1995, updated every 5 year) by Government of Japan; Ministry of Economy, Trade and Industry of Japan- «New Japan's Robotic Strategy» (2015). Also the papers of following researchers were used- Mead R., Atrash A., Mataric M. J. (2011); C. Breazeal (2002); Min Kyung Lee, Sara Kiesler, Jodi Forlizzi (2010), Yun (2015), Kodama (2018), Kodama & Shibata (2017) etc..

Methodology: main methods used in this study include historical analysis, document analysis, descriptive method, comparative analysis, mixed qualitative and quantitative research method. Quantitative and qualitative analysis will take the significant part of the research in order to understand the reception of social robots within Japanese society.

Finding/ results: The growing popularity of social robots in Japan has quite strong social grounds and economic potential. Nowadays Japan actively introduced the robots into different sectors of human life, especially service sector, healthcare and education. This is due to the fact that in recent decades Japan experiencing a demographic crisis- the population is rapidly aging and shrinking which led to labor shortage and low level of labor productivity. It is believed that social robots able to solve these socio-economic problems and Japanese society is ready to introduction of social robots in various sphere of human life activity.

Research limitations: Chronological framework limited from 1945 till 2017, the paper has concentrated on social robots only.

Keywords: social robots, social robots and society in Japan, robots and economy in Japan

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3.

Open Innovation guarantee practices for banking industry in Myanmar

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Abstract

Purpose/ Research Question:

This paper aims to analyse the current problems of the banking sector in Myanmar and improvement practices for solving them. Myanmar banking system is far behind from the international standard and the least developed in South East Asia. There is a lack of public trust in the banking sector which was created by Myanmar's financial history.

The research question of the paper is why such lack of public trust in the banking sector formed, and what kind of improvement practices are going on.

Key Literature Reviews (About 3~5 papers):

To learn the problems of Myanmar banking system, first thing to learn is the financial history how the problems was created. Turnell (2002) describes the banking history back to 1962 when the Revolutionary Council government nationalized all privately owned banks in the country. Later, the military government merged all banking into a single entity that would later be dismantled into four separate state-owned banks. In the early 1990s, the market was opened again to privately owned banks, but the 1997 Asian financial crisis, Myanmar's 2003 domestic banking crisis, and international sanctions severely impaired the development of the sector (Turnell 2002).

Since 2011, new government have enacted a series of reforms try to develop the financial sector as part of their agenda for opening Myanmar economy and accepting foreign direct investment in order to accelerating economic growth. The role of financial and banking sector and the importance for every economy can be stated as follows. A sound financial system is an essential for every economy. Turnel (2014) stated the financial sector mobilizes savings and allocates credits to other sectors to promote economic growth. It provides not only payment services but also enables coping with economic uncertainties by hedging, pooling, sharing, and pricing risks. Therefore, efficient financial sector can assist for reducing the cost and risk of producing and trading goods and services and thus makes an important contribution to raising the standard of living.

In Myanmar, the financial and banking sector should fulfill the role. For almost five decades, Myanmar's population and economy faced harsh restrictions under the rule of a military junta which set up a strict socialist regime (ADB 2012). The international sanctions under the military rule led to international isolation of the nation. In Southeast Asia, Myanmar has become the poorest country with the lowest level of financial intermediation.

In many countries, loan guarantee programs are important elements of government policy with respect to small- and medium-sized enterprises (SMEs). Riding (2007) showed if loan guarantee schemes are to be effective, a majority of firms obtaining assistance through such a scheme ought not to be able to obtain financing from existing sources: a property known as incrementality.

Salvatore Zecchini and Marco Ventura (2009) provides an in-depth evaluation of the impact of public credit guarantees to SMEs in increasing credit availability and reducing borrowing costs, without compromising their financial sustainability, taking the case of Italy. Extensive econometric tests have been carried out by comparing the performance of the SMEs that benefited from such guarantees in Italy with a sample of comparable firms. The findings confirm the presence of a causal relationship between the public guarantee and the higher debt leverage of guaranteed firms, as well as their lower debt cost. Italy's guarantee instrument has proved to be an effective instrument in these respects.

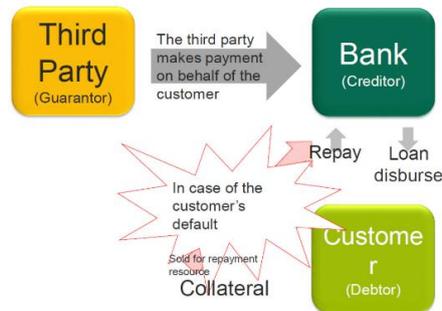
Design/ Methodology/ Approach:

Financial institutions play a central role in a country's economic development. However, in Myanmar, the sector is lag behind as stated. As discussed one of the major problems is the lack of trust from citizens.

This paper focus on the case of prototype guarantee system established in 2014 by SMBC

to Myanmar and analyses how to establish the trust in banking sector in Myanmar. The prototype system is as shown in Figure 1. Based on the authors' survey in 2018 at Yangon Myanmar, the innovative practices by a Japanese private bank are examined.

Figure 1 Prototype of Guarantee system



(Expected) Findings/Results:

In order to develop countries economy, SMEs are playing important role for development. The findings of this paper are (1) detail processed to introduce prototype of guarantee system for SME loan in Myanmar, (2) problems in governmental sector to introducing new system, and (3) analysis of achievement as of 2018.

Research limitations/ Implications:

The banking sector in Myanmar requires various kind of improvement practices to upgrade to international standard stage. This paper tries to shed light to the problem by analyzing the important trust building institutional approach. This social open innovation approach to the Myanmar banking system is very important, but limited from one aspect of the entire banking .

issue

Keywords: Banking sector, Myanmar, trust, SMEs

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Journal of business venturing

Salvatore Zecchini and Marco Ventura (2009) The impact of public guarantees on credit to SMEs, *Small Business Economics*, Volume 32, Issue 2, pp 191–206

4.

Sharing What Is Learned from Outside Industrial Training with Organizational Peers

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Nu Nu Mai

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Abstract

Purpose/ Research Question: The present study aims to investigate sharing of 'what is learned from outside industrial training' with organizational peers. The subjects are trainees for the

management related courses at Myanmar-Japan Center for Human Resource Development (MJC). Although trainers' primary objective is to acquire knowledge and skills taught in the trainings, they are expected to disseminate what is learned to their own organizations. In addition to learning by trainers themselves, we focus on the sharing of knowledge and skills with organizational peers, particularly from the perspective of their role as internal trainers/facilitators.

Key Literature Reviews (About 3~5 papers): In order to specify our research framework, we should consider three field of studies, that is, training transfer, training of trainers (ToT) as well as knowledge sharing. Here we want to introduce the recent literature reviews in each field.

Training transfer is the application of the knowledge and skills acquired from training through behavioral changes of trainees. Blume et al. (2010) presented a meta-analysis of 89 empirical studies on the effect of predictive factors on training transfer to different tasks and contexts. It also examined moderator effects of the relationships above. Specifically, motivation and work environment had stronger relationships to transfer when the focus of training was on open (e.g., leadership development) as opposed to closed (e.g., computer software) skills, both of which are included in the courses provided by MJC. Moreover, Baldwin et al.'s (2017) conceptual paper suggested based on their review of the literature that the researchers should move toward more consumer-centric outcomes. Their recommendations for further efforts will be (1) systematically report information related to the trainees, trainers, and organizational contexts; (2) focus explicitly on the optimization of transfer; and (3) expand the measurement and reporting of transfer outcomes. Here in this context, it may advance the literature by including more explicitly the organizational peers (potential indirect consumers) of external training trainees (direct consumers).

ToT has been considered and implemented as an effective strategy for the dissemination of knowledge and skills by utilizing a cascading model. Pearce et al. (2011) reviewed 18 prior studies on health and social care professionals, for which various ToT interventions were conducted from didactic presentations to group discussions and role-plays. The evidence showed that using a blended learning approach can help to effectively disseminate and implement guidelines and curricula.

Studies on knowledge sharing are also useful to enrich the discussion as it is one of the important parts of the knowledge management system through teaching and facilitating efforts by the trainers of external training. According to Witherspoon et al.'s (2013) meta-analysis of 46 studies on antecedents of organizational knowledge sharing, three categories of antecedents were found to significantly predict knowledge sharing behavior; knowledge sharer intention and attitude, rewards for knowledge sharing, and organizational culture.

By integrating all the above discussion, we may develop a more comprehensive framework to analyze the present topic.

Design/ Methodology/ Approach: MJC has provided local executives and employees with management related knowledge and skills by their training courses. However, their training evaluation is mostly on learning by trainees while transfer of learning has not been well investigated. We select the courses trainees of which are required to teach and disseminate knowledge and skills

acquired to their organizational peers, so as to achieve effectiveness in practice. Tentatively we plan to take those related to production management, such as 5S, kaizen (continuous improvement) and quality management.

The research framework is along with Baldwin and Ford's (1989) basic model on training transfer, as that has been still utilized by researchers with modifications. Data collection will be multi-wave based. Before the courses, their initial knowledge and skills will be evaluated by the placement test. Moreover, trainee characteristics (self-efficacy, learning readiness and demographic characteristics) as well as perceived work environment (support from supervisors and peers, and opportunities to use) will be collected. After the courses, same information will be collected. Then three months later, retention of the knowledge and skills will be evaluated while the degree of their dissemination to the organizational peers will be also collected. The relationships among trainee characteristics, perceived work environment, learning and transfer particularly in terms of dissemination to the peers will be analyzed by structural equation modeling.

(Expected) Findings/Results: We expect all the predictors will be effective to improve transfer of training by MJC course trainees, in particular, in terms of sharing of knowledge and skills they acquire with their organizational peers). More specifically, learner readiness, self-efficacy and supportive work environment will have positive effects on the training transfer both directly and indirectly through learning.

Research limitations/ Implications: The effect of the program cannot be identified rigorously, because we will not compare treatment and control groups due to the research design. For further studies, training providers can specify the effect of different training designs, for example, by introducing additional interventions such as teaching and facilitation skills under random assignment. The results are expected to provide the direction for trainees, their organizations and training providers on how each party would be able to contribute to achieve the dissemination of learning to workplaces.

Keywords: training transfer, training of trainers; knowledge sharing

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5.

The Suggestion of the Toyota production system using IoE by JTEKT

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Abstract

Purpose/ Research Question:

The number of IoT devices is drastically increasing in the world, nearly 27 billion in 2017, and will surge to 125 billion in 2030 as reported by IHS Technology. Japanese government promotes using IoT devices for improvement of production efficiency. Japanese government (ministry of economy) called that politics "Connected industries". In the company base JTEKT Corporation call IoT business IoE solution and develop. This paper aims to provides an effective case of IoT company JTEKT under the concept of Toyota Production System TPS in Japan.

Key Literature Reviews (About 3~5 papers): Contents

Many IoT business are introduced by some essays until now. However most of IoT business are rearrange a part of the works and pace up (Ishino 2016, Kodama & Shibata 2017, Kodama 2018, Jeong 2016). For example, home electric appliances (air conditioner, Illumination HDD recorder) are connected for remote control and security (Kohno et al 2015). In financial industry, many people use IoT devices to make remittance and exchange money without going bank. People calls that service mobile payment service. Furthermore, attached drive recorder to analyze driver's trend and auto calculate insurance amount in the automobile insurance industry. These examples are machine

and system perform work in place of people. However, their purpose is job performance efficiency, what thought lightly of human. Additionally, that activity needs high cost to save memory by cloud server. Hence, it is very high hurdle to begin the introduction of IoT technology.

Design/ Methodology/ Approach: Contents

JTEKT think human is the most important element in production. JTEKT corporation was established as an independent company, merged with former Toyota Motor Corporation machine tool division, and Koyo Seiko Corporation (Bearing and steering company). As JTEKT is based on TPS, JTEKT sales TPS enhanced with IoT for improving functions of machine tools and mechatronics (machine & electronics). JTEKT think production's main as human and named IoT business IoE solution (Internet of Everything solution) proposes to customer. IoE solution is consisted 4step solutions. (STEP1 : Connecting solution STEP2 : Visualizing solution STEP3 : Value solution STEP4 : Chain solution) They are making the 4step solution products, and proposing to use these things and promote improving Quality control activities. For gathering machine tool's information by STEP1 product (Be able to connect many industrial telecommunications standardized PLC [Programmable logic controller], TOYOPUC-Plus) and changing effective information by STEP2(Visualize and customize Andon system for each customer, TOYOPUC -Hawkeye and able to connect many state lamps, JTEKT-SignalHop). After they recognized which machine causes error through STEP1 and STEP2 activities, Engineer analyzes causes and solves by STEP3 product (Installed statistics software and to be able to set automate stop rule, edging computer TOYOPUC-AAA). Finally, user share product's their experience and knowledge by STEP4 service (Protect and share experience system JTEKT Remote care). JTEKT propose using 4step solutions and take products working in Toyota production system part of Kaizen activity (quickly recognize error, analyze cause and standardization) instead human for improving production.

(Expected) Findings/Results: Contents

STEP1 and STEP2 case

In JTEKT Kariya factory, JTEKT's all machine tools are produced there and used by themselves. So, they tried to visualize some parts of line for quality control activity. But there are many very old machines, they should dispatch of engineers and perform wiring works. Including personnel expenses, total budget needs almost 300 thousand dollars. For avoiding costs, JTEKT considered to use already set 6 kinds 143 state lamps on the machines in lines and designed below specifications.

1. Whoever can connect some machines. (not required construction person)
2. Don't design and wire work for connecting machines
3. Use few tools to manage and monitoring machines works
4. By the light receiving sensor and wireless, transmit machine's status to receiver
5. For flexible length connecting transmitter and light receiving sensor use rubber cable.
6. Use double sided tape for easily connect

Finally, JTEKT cost cut about 75% (most decrease costs are design and construct fee) and sale improvement tool JTEKT-SignalHop.

The other cases, another company wanted to monitor installed equipment detail status. That

company was checking movement completion by status lamps on 8 instruments and enter next work program. Therefore, workers couldn't recognize and keep under suspension. So, they launch TOYOPUC-Hawkeye (customize TPS's Andon system for each users). TOYOPUC-Hawkeye needs gather information through PLC (Programable logic controller) of instruments. However, people generally can't connect and manage information with different manufacturer PLC because their telecommunications standard are different. For solving problem, they use TOYOPUC-Plus that has basic telecommunications standards. As a result, they can monitor difference manufacturing instruments detail status. For the details, they can see the remaining each work time and think priority of work programs. TOYOPUC-Hawkeye's layout is constructed by only some image icons and numbers for whichever national workman. And each workman can grasp themselves' works, appropriate number of people distribution.

STEP3 STEP4 case

One factory produces parts with machine tools, but these machines broke down often occurred. The another, their works operation are always required that attentiveness of the machines. If their state worsens even a little, defective articles occur. Therefore, there was a demand to want to manage the abnormal trends perception and omen for the processing thing in the factory, not abnormal perception when machines broke down. They launched TOYOPUC-AAA that installed machine learning engine and analyze by statistics software. They achieved what they called TPS's automation stop system, not to occur defective articles. And use that analyzing data to educate skill training time shorter.

Research limitations/ Implications: Contents

There are many IoT cases, that reasons telecommunications standards and capacity, existing instruments connecting and data problems are occurred. In addition, most cases occupied by the person contempt. JTEKT sales TPS system that main humanism IoE business. That improved many factories produce volume and speed. However, it is only JTEKT products and IoT basic technology, their quality control activity is incompletely improvement.

For proceeding QC activity, we need to unite new IoT skill and another company's skill. This is a problem of everlasting technical introduction for a growing up company. Therefore, engineer needs continue keeping attitude to introduce new skills.

Keywords: JTEKT, Toyota production system, Andon, IoE, Quality control activity

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6.

Challenges of Governmental Policy Changes in Myanmar Higher Education Development

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Abstract

Purpose/ Research Question:

Last year, Myanmar's new Investment Law has been passed to increase international investments and support to move Myanmar economy forward. However, there are some major challenges for developing the country such as develops strong financial services sector, infrastructure sector and so on. Among them, it plays vitally important role for building a competitive higher education system which can prepare the country's young population for the challenges ahead. After over 50 years of isolation, Myanmar's higher education system was a completely failure under military rule so that it is very hard to find skilled workers in Myanmar nowadays. Recently the condition of Myanmar university education is still underfunded and poorly governed. Therefore, most of the tertiary students in Myanmar are facing complexities of the system.

In 2013, Myanmar new government tried to set a project called "Investing in the Future: Rebuilding Higher Education in Myanmar. It states that Myanmar's primary, secondary and tertiary education sector must solve the current problems of over centralization and the process of decentralization that is currently underway. Without a dramatic increase in changing higher education policy over the next several years, Myanmar human capital in all sectors will have big

fallen due to very outdated management education system. To improve these sector once again, it needs immediate action from governmental actor with upgrading or changing old higher education management policy for who find themselves unskilled, under employed, or out of work. Therefore, this study attempts to point out the major challenges of governmental policy changes in Myanmar higher education development. This research asks the following question:
How can the governmental new policy overcome Myanmar poor higher education system effectively?

Key Literature Reviews (About 3~5 papers):

Higher education policy refers to the modernization agenda for universities, principally governance, autonomy, funding, research and external quality assurance (Pavel 2012, OECD 2003, Boer, Jongbloed, Benneworth, Westerheijden, & File 2012, Homayoun 2018, Byun 2018).

Policymakers of higher education should create HE system by avoiding over-regulation and micro-management and guiding universities through a framework of general rules. They need to give full autonomies to universities to take responsibility and accountability for their curriculum or program, staff and resources (Kim 2018).

Moreover, They also should be effective external representation in university decision making, overcome internal fragmentation, encourage their universities to develop structured partnerships with the business community such as economic development, improve the career prospects of researchers, increase the relevance of education programs, create more possibilities for patenting and licensing, and develop additional sources of funding (Boer, Jongbloed, Benneworth, Westerheijden, & File 2012, Estermann, Nokkala & Steinel 2011, Zumeta 2000, and King 2006)

Design/ Methodology/ Approach:

The qualitative research design is used in this study. In-depth individual interviews conducted with very important high-ranking officers in department of higher education Myanmar to explore their perspectives on their particular idea and situation proceeding from three complementary and linked strategies and programmes of MOE will be implemented to achieve the transformational shift for higher education.

The research question is how can the governmental new policy overcome Myanmar poor higher education system effectively.

The Sample is selected from the government high ranking policymakers of department of higher education Myanmar. All the interviews are recorded to accurately capture the data. Then the interviews are transcribed and analysed accordingly. The data collection procedure involved the use of semi-structured questionnaire, which was used as an interview guide. Some certain questions were prepared in reference to three complementary and linked strategies and programmes of MOE. But some additional questions were occurred during the interviews.

(Expected) Findings/Results:

This research paper is able to guide Myanmar government for making our higher education

system to meet global standards and support our government for becoming a systemic problem solver of Myanmar higher education system. Moreover, this research can highlight the positive and negative facts of Myanmar higher education system based on VIP interviews of department of higher education Myanmar. In the beginning, the research asks the following question: How can the governmental new policy overcome Myanmar poor higher education system effectively?

Therefore, for the future development of Myanmar higher education, the government should follow the below steps in order

Step (1): totally change government policy towards authority in the hands of university leaders, their deans and the faculty

Step (2): Allow citizens to officially open private universities without any delay

Step (3): provide enough financial support to public and private universities

Step (4): urgently change new curriculum based on new knowledge which having it tested, criticized and evaluated by many different filed of academic persons.

Research limitations/ Implications: Contents

The findings are based on the research held 2018 in Myanmar . This finding might be applied and used for other developing countries.

Keywords: Myanmar, policy, Higher Education, and universities

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7.

Open Innovation Culture and Its' Cycle

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Introduction

Open innovation has become one of the hottest topics in innovation management and has been found can provide the firms commercial success(Brettel, Cleven, & Management, 2011). A search in Google Scholar on open innovation provides over 2 million hits, Henry Chesbrough's 2003 book has gathered more than 1,800 citations in just seven years

(Google Scholar, July 2010), and surprisingly a wide range of disciplines, including economics, psychology, sociology, and even cultural anthropology (Von Krogh & Spaeth, 2007) have shown interest in it. One of its most often used definition is: 'the use of purposive inflows and outflows of knowledge to accelerate internal innovation, and to expand the markets for external use of innovation, respectively' (Chesbrough, Crowther, & Management, 2006).

As an intangible asset of firms, corporate culture has been acknowledged as an important component of organizational success (Irani, Beskese, & Love, 2004) (Yusr., 2016). Innovation culture refers to the shared common values, beliefs and assumptions of organizational members that could facilitate the innovation process. When an organizational culture or climate encourages the employees' innovation capacity, tolerates risk, and supports personal growth and development (Menzel, Aaltio, & Ulijn, 2007) the organizational culture may be labelled as an 'innovation culture' (Martín-de Castro, Delgado-Verde, Navas-López, Cruz-González, & Change, 2013).

Brettel, Cleven et al. (2011) also explored a research on a firm's innovation culture affects on its openness to collaborate with external partners which can form an open innovation culture- and for that behavior to influence the firm's new product development performance. Thus, this study opts to explore what kind of culture motivate open innovation and the concept of open innovation culture.

Mentioning the open innovation, there must exist the change and complexity (Yun, Yang, Park, & Society, 2016) (Yun, 2015) (Battistella, Toni & Pessot, 2018). Without the stability and predictability, firms might need time to make the adaptation which may lead them very difficult to live with or profit from (Morris, 2007). In addition, integrating innovations had been mostly studied from an absorptive capacity perspective, but with less attention given to the impact of competencies and culture (West & Bogers, 2014). This means if a firm search for the outside collaborators, the firm's absorptive capacity is one side, the outside collaborators' understanding of the firm's culture and their adaptation might decide their contribution to the firms. Thus, to understand better of the factors that affect the open innovation culture and their affecting mechanism might help the firms to cultivate a more adjusted culture towards motivating open innovation.

Literature Review

In Morris(2007)'s study, an innovation culture and its' cycle shows. In here, three factors that may emerging the innovation culture had been suggested. The first is the innovation champions, which defines the practices that enable innovation, eliminate those that impede it, and in so doing enable the innovation culture. Second is the creative geniuses means the applying the know-how that results in insights, ideas and ultimately innovation and produce innovation results. The last one is the innovation leaders which define as the policies that enable innovation, and eliminate those that impede it, thereby taking a lead role in creating the innovation culture. With considering these characteristics of three factors that might emerging the innovation culture, the individuals in the organizations, entrepreneurs, and the organizations are thought own the similar characteristics to emerging the innovation culture. To cultivate a culture that motivate the open innovation, in an organization, the individuals search the ideas or concepts both inner and external by licensing in or out, then these practices might transfer their ideas or concepts to organizational members or even lead themselves to be the entrepreneurs. Then entrepreneurs may develop the ideas through spin in or spin out. Gradually, entrepreneurs' know-how may nourish the business within an organization, during the implementing the business into economic value, revenue acquirement is good, otherwise, comparing the divest the entering into the market first, to build a more perfect business model is much better. Further, the implementing mechanism of organizations might promote the policy to motivate them to search for innovative ideas openly. Thus, open innovation culture could be defined as "the sum of importing and exporting concepts by individuals which could cultivate the entrepreneur open innovation culture, through spin in and spin off to shift those concepts into business models by entrepreneurs which could lead the customer-based open innovation culture, the co-exist of acquirement and divest within an organization promotes an open innovation policy which might boost the employee open innovation culture".

During the three roles promoting the open innovation culture process, individuals within the organizations affect by the open innovation policies might engender the employee open innovation culture, through importing and exporting the knowledge and ideas, a structure which can labelled as "open innovation structure" would cultivate the entrepreneur open innovation culture. To realize the ideas or concepts into economic value,

entrepreneurs would build a good business model to meet with customers. Customer multiple needs based business model may cultivate the customer open innovation culture to provide the organization with entire open innovation climate which can motivate the employees to form a culture to conduct more open innovations. According to those arguments, research framework is the same as the figure 1 suggested.

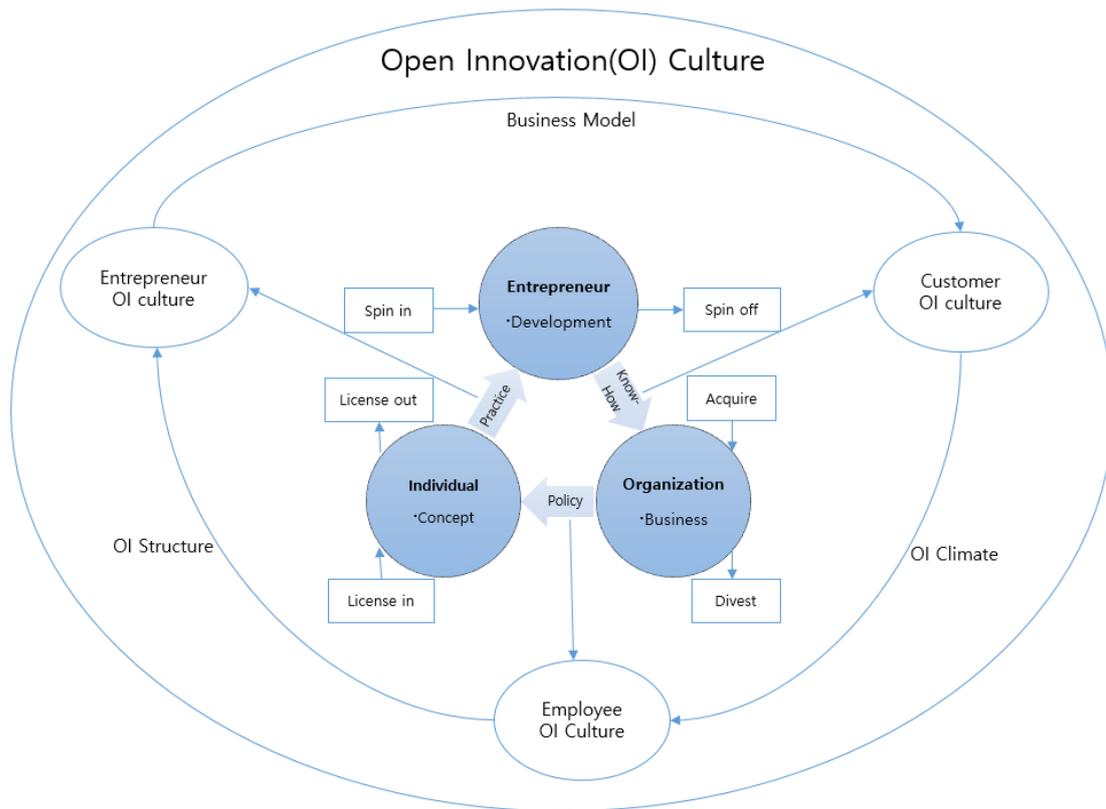


Figure 1. Research framework: Open Innovation Culture and its' cycle

Methodology

Field Research would be done by investigating with three countries' IT companies. The USA Apple, Google, Facebook; Korea Samsung electronics, Naver, Kakao; China Huawei, Alibaba, Wechat. The firms' vision, belief or culture et al. might imply the OI culture of employee; the CEOs' mottos, leadership et al. to measure the entrepreneur OI culture; organizational factors like structure, strategy innovation or reform could be expressed the customer basedl' OI culture.

In addition, intensive interviews would be used based on the half-structured questionnaire to analyze the open innovation culture within China. The intensive interview is directed towards the generation of grounded theory, using the logic of theoretic sampling and the method of snowball sampling (Harkess, Warren, & Research, 1993). A semi structured interview is a verbal interchange where one person, the interviewer, attempts to elicit information from another person by asking questions (Longhurst, 2003); (Yun et al., 2017).

Expected Findings

To verified through the open innovative activities by individuals, entrepreneurs, and organizations to cultivate the entrepreneur OI culture, customer OI culture, and employee OI culture separately. In addition, by knowing how these three OI culture cycling would help to yield a significant improvement for firms' open innovation performance and decline the open innovation engendered the complexity. Implementing an open innovation is not going to be easy, but making a better understanding of this cycle might help to build an open innovation structure inner the organization, form an open innovation business model and provide an open innovation climate for supporting the emergence of the open innovation culture, thereby foster a higher open innovation performance.

Keywords: Open Innovation Culture, Individuals, Entrepreneurs, Organizations, Cycle

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8.

Graduates' career choice towards social enterprises and NPOs

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ABSTRACT

In recent decade, the development of social enterprises and nonprofit organizations have attracted more people's attention worldwide. It was observed that there has been an increased number of young graduates in Taiwan who tend to select social enterprise or nonprofit organizations as their first career choice even when given multiple job opportunities. This exploratory study aims to examine the possible influential factors which motivates the career decision process of Taiwanese students when making their career decision of joining these organizations. 10 graduates who chose social enterprises or nonprofit organizations as their first job were interviewed. The findings from this research prove life circumstances and learning experiences build up to one's career choice, excluding family expectations and conditional challenges.

Research Background

During the past decade, nonprofits and governments have worked together in a deliberate partnership; government provided some services, and philanthropists filled in the gaps. However, current development of major social sector institutions are often viewed as inefficient, ineffective, and unresponsive (Dees, 2001). As a result, not only has there been a large growth in non-profit organizations, new business models have been developed as a way to bridge non-profit organizations and for-profit corporations.

The Taiwanese Ministry of Interior pegs the number of registered non-profits at over 60,000 and near 5,000 for social enterprises (Mirza, 2012). However, one of the greatest challenges that this industry faces in Taiwan is the concern for sustainability. With the new trend in the

business community in Taiwan, understanding how to attract talents to sustain these businesses has become a primary focus for SE and NPO.

Review of the Key Literature

Social and economic conditions promote particular career paths, as well as a series of factors such as culture, gender, genetic endowment, and life conditions (Brown, 2002). Researchers are well aware that career development is a cognitive process, taking barriers to choice, change, and growth into consideration (Brown, 2002). It is also noted that individuals may also make a decision in response to the career opportunity presented by a chance event (Bright, Pryor, Chan, & Rijanto, 2009).

Career decision has often been linked with personal characteristics and personality to explain behavior. However, further development has been contributed to elaborate career decision-making process. These career interests can also be expressed as behaviors or actions, and are a means by which people attain their values and meet their needs (Super, 1995). The Social Cognitive Theory (Bandura, 1986) provides a useful framework for encompassing diverse influences upon career behavior, which was initially developed to address the role of background variables, self-efficacy, and outcome expectations in the development of vocational interest, career choice, and work performance, and it has recently been extended to both work and educational satisfaction (Lent & Brown, 2006, 2013).

Interactions with or observation of family members, peers, teachers, other significant persons, cultural and religious institutions, and print out electronic media sources provide much of the context for imparting values and personal standards of behavior (Lent, Brown and Hackett, 1994). By linking various organizational or environmental experiences (past and present) to their already formed individual values, emotions, and expectations, they form future work intentions and behaviors (Bandura, 1986; Lazarus, 1991).

Methodology

The purpose of this research is to have a better understanding of the motivating factors that affect Taiwanese students holding a postsecondary degree in choosing Social Enterprise or NPO as their career decision when faced with multiple job opportunities, especially with consistent research proving the lack in financial compensation and job security in these business models. Due to lack of empirical data as well as minimal research in this aspect, a qualitative approach is used in this research in order to further understand the participants of the research by interpreting the events described through the interview, rather than studying people and forming interpretations (Benjamin and O'Raeilly, 2011).

The interview design is based on the series of possible affecting factors to one's career choice that was proven through existing empirical studies as well as open-ended questions to build further understanding of the participants' experience. The first set of questions involved light conversation about the participant's background regarding their family, themselves, academic experience and as well as current and past working experience. Next, the participants provided further details regarding each experience such as each academic, extracurricular activity they participated. Each participant continued with further explanation to help express their emotions, attitude, as well as their own explanations of how each key experience transformed their decision one by one.

Expected Findings and Implications

Our findings will contribute to the social cognitive theory by understanding why and how Taiwanese graduates select social enterprise or nonprofit organization as a career choice. A career decision-making process of selecting social enterprise or NPO as their first career choice by Taiwanese graduate students would be proposed, which will be beneficial for these organizations as it is concerning for social enterprises if there are not enough talents to meet the demand for labor, especially with the steady increase in in the business market. This can also lead to insight of what attracts and motivates young Taiwanese graduates as social enterprises have a higher turnover rate than mainstream enterprises..

KEYWORDS:

Social cognitive theory, career motivation, social enterprise, nonprofit organization, external environmental influences, self-efficacy, outcome expectations, goal representation.

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9.

The study of social entrepreneurial teams

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Abstract

This study aims to investigate the nascent social entrepreneurial teams in order to reveal the entrepreneurial process of establishing a firm from zero. Since the growing amount of start-up social enterprises in Taiwan, a number of researches investigated the individual social entrepreneurs, the development of social enterprises, and the process of social entrepreneurship from different perspectives. However, there is little research focused on the nascent social entrepreneurial teams to investigate how they identify entrepreneurial opportunities, find resources, choose partners, allocate works, cooperate with each other, and then finally establish a firm in the start-up stage. Therefore, this research will adopt qualitative research method to interview the founders and social

entrepreneurial team members and do further analysis with grounded theory approach.

Purpose/ Research Question:

1. To recognize how previous industry experience/ team working experience/ start-up experience of each member in the nascent social entrepreneurial team can help the firm develop and grow.
2. To reveal what resources the heterogeneity/ homogeneity team member provides to facilitate the development of social entrepreneurship in the nascent process.
3. To find what are the important human capitals that the nascent social entrepreneurial team need.
4. To identify what resources of social capital/ social network that the nascent social entrepreneurial team can acquire and apply.
5. To examine whether the social entrepreneurial team focus on economic and financial goal are more likely to establish firms than those are not.
6. To recognize what collaborative style and interaction between social entrepreneur and entrepreneurial team members influence the process of social entrepreneurship.

Key Literature Reviews (About 3~5 papers):

Some empirical studies have already pointed out that firms founded by teams are generally more successful than those founded by individual (Mayer, Heinzl, & Müller, 1990 ; Doutriaux, 1992 ; Vyakarnam, Jacobs, & Handelberg, 1999). It revealed that the process of entrepreneurial team formation played an important role on founding a profitable firm.

As some research indicated that the social entrepreneur needs people and stuffs in the most basic resource level. For the social entrepreneurs, people are the most important element because they provide various intangible resources, such as skills, knowledge, responsibility, etc. In addition, building a strong team can compensate for some disadvantages but social entrepreneurs need to confirm that team members have equipped the required knowledge and skills to guarantee pursuing opportunities (Guclu, Dees, & Anderson, 2002). In order to survive, enterprise needs to construct new business models have the character of "knowledge insurance" strategies (Cooke, 2016).

Other researches showed that entrepreneurial team is essential for acquiring resources, since every member provides some accessible important resources, not only directly through the team members

themselves but also indirectly from connecting to other networks, and further create an stable team structure which easily accumulate the ideas inward (Burt, 2009; Fern, Cardinal, & O'Neill, 2012). The resources that provided by team members of new venture have more chance to establish a firm (Ucbasaran et al., 2003). Mutual cooperation with each other in a team facilitates them to build trust and collaborative skills which strengthen risk-taking activities (Oganisjana, 2015). In addition, the metacognition ability of entrepreneur is important to transfer new ideas and resources into strong innovative behaviors (Kim & Lee, 2018).

Research focused on entrepreneurial teams showed that resource heterogeneity in teams with more extensive industry experience has a more positive effect on profitable firm creation than in teams with lower industry experience (Muñoz-Bullon, Sanchez-Bueno, & Vos-Saz, 2015). In addition, entrepreneurial teams members with various professional skills are expected to perform well than homogenous team when identifying opportunities and employ them. However, it is argued that entrepreneurial teams with a diverse mix of skills are sometimes less effective and do not perform as well as homogeneous teams (Jackson et al., 2003 ; Kakarika et al., 2011).

Design/ Methodology/ Approach:

To investigate how previous industry experience of social entrepreneurial teams help to establish the firm in the process, reveal what resources the heterogeneity/ homogeneity team member provides to facilitate the development of social entrepreneurship, this research adopts the grounded theory method to categorize some concepts and then build model.

The data are collected through semi-conducted interviews to realize how the social entrepreneurial teams form in the process and how can they acquire resources from team members. Moreover, the target interviewees in this research are focused on those innovative social enterprises found by nascent entrepreneurial teams which have more than three people, and the interview will be conducted with the founder and co-founders or core-team members who permit to record during the process. It is estimated that the total number of social enterprises which accept our interview can reach about thirty. For data analysis, transcribing the interview content into transcript for further comparison and investigation.

(Expected) Findings/Results:

The findings would contribute to the understanding of social entrepreneurial teams by investigation from the perspective of the team formation and composition in the nascent process. Moreover, the results will provide the recognition of how social entrepreneurial teams acquire resources through team members, and realize how heterogeneous or homogeneous team member will influence the

team during the nascent process to build a firm.

Furthermore, this research aims to increase more and broad understanding of social entrepreneurial teams by providing a model to represent their interaction, team formation, member composition, and resources acquisition clearly. It is expected that this research findings can help those who want to do research on the topic of social entrepreneurial teams for further investigation or benefit those who want to compose a team to enter the field of social entrepreneurship.

Research limitations/ Implications:

Here are some research limitations. There is little research focused on social entrepreneurial team so it is hard to apply some academic theories to analyze the results. Moreover, lots of social enterprises were found mainly by individual than by teams in Taiwan. It would be difficult to find many social entrepreneurial teams to interview and collect enough data. Furthermore, since the social entrepreneurial teams are busy in work, there may not have many team members to attend the interview. In most of conditions, we can only interview the founder and co-founder or co-team members for two to three people in total. So, it may restrict or influence the comprehensive understanding of the thoughts from the team members a little bit.

Keywords:

Social Entrepreneurial Team, Social Enterprise, Social Entrepreneurship, Resource acquisition, Resource development, New venture formation and growth, Networks and social capital, Knowledge, experience, human capital

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10.

**Research on the Process of Resource Bricolage and Organizing Improvisation
in IT Innovation: A Case Study of Baida Zhongxing**

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Abstract

Purpose/ Research Question: IT has increasingly participated in the competition of organizations. For many companies, the important issue is how to obtain the competitive advantage of enterprises through digital IT in a fiercely competitive environment. In the face of an uncertain market environment, companies often face the pressure of transformation. As a new source of enterprise innovation, IT can help companies respond quickly and gain competitive advantage in helping companies cope with the turbulent environment.

A turbulent market environment may cause companies to weaken their competitive advantage. This requires the ability of enterprises to respond quickly, adopt strategies in response to turbulent environments, act spontaneously and improvise without preparation. At the same time, the utilization of resources is also a problem that enterprises need to pay attention to in a turbulent environment. Companies should look for reliable resources to cope with unexpected situations in improvisation. The existing literature has also been concerned with resource patching and organizational improvisation in a turbulent environment, but does not consider the changes from the perspective of the situation. Therefore, this study will explore the interactive process of resource patchwork and organizational improvisation from the context of IT innovation.

This article takes IT innovation as the background, takes Baida Zhongxing as the case study object, adopts the exploratory single case research method, the enterprise strategic action triggered by IT innovation, the resource patching and organizational impromptu interaction in IT innovation, the resource patching and organization in IT innovation. The three aspects of impromptu evolution are analyzed.

Key Literature Reviews (About 3~5 papers):

1. Della Corte, V. Innovation through Coopetition: Future Directions and New Challenges. *J. Open Innov. Technol. Mark. Complex.* **2018**, 4, 47.
2. Robbins, P. From Design Thinking to Art Thinking with an Open Innovation Perspective—A Case Study of How Art Thinking Rescued a Cultural Institution in Dublin. *J. Open Innov. Technol. Mark. Complex.* **2018**, 4, 57.
3. Tani, M.; Papaluca, O.; Sasso, P. The System Thinking Perspective in the Open-Innovation Research: A Systematic Review. *J. Open Innov. Technol. Mark. Complex.* **2018**, 4, 38.

Design/ Methodology/ Approach: This study uses Baida Zhongxing as the case study object and adopt an exploratory single case study method.

(Expected) Findings/Results: Firstly, IT innovation has undergone a shift from content IT innovation to structural IT innovation and has led to corporate strategic actions. In the face of evolving IT technology, enterprises are initially adopting a wait-and-see strategy. First understand the development and changes of IT innovation to the industry. However, due to the impact of content IT innovation, enterprises still have to adjust their original development strategies. When the existing development encounters problems, the enterprise begins to take the initiative to adopt content IT innovation to transform itself, and is supplemented by structural IT innovation for internal and external coordination. Finally, the enterprise adopts an offensive strategy, which not only actively integrates into the action of IT innovation, It also independently developed new technologies and

became the initiator of IT innovation, using structural IT innovation to transform, and supplemented by content IT innovation for external adjustment.

Secondly, it constructs a process model of resource patching and organizational impromptu interaction in the process of IT innovation. As the type of IT innovation changes, different IT innovations lead to the difference between resource patchwork and organizational improvisation, which in turn affects the interaction process of resource patchwork and organizational improvisation. During the exploration period, the first time enterprises face content IT innovation will be more flustered, which requires impromptu actions of enterprises, and the resource patching behavior of enterprises is more important in combining existing resources, so organizational improvisation is more important at this stage. . In the integration period, enterprises actively integrate into IT innovation. Enterprises have certain experience in impromptu actions in emergencies. At the same time, the patchwork of internal and external resources is also being carried out simultaneously. At this stage, organizational improvisation and resources are patched together. In the expansion period, enterprises actively use IT technology to achieve innovation. Because it is the self-behavior of enterprises, the improvisation of enterprises is relatively weak, but the dependence on resources increases, so the process of resource patching will be stronger than organizational improvisation.

Finally, it sorts out the evolution process of resource patchwork and organizational impromptu interaction in the IT innovation process. In general, the impact of resource patchwork on enterprises is gradually increasing, and the impact of organizational improvisation on enterprises is gradually decreasing. The reason is that the turbulent environment encountered in the initial stage of enterprise development requires enterprises to respond in a timely manner. This requires the construction of improvisation capabilities of enterprises, especially for the development of scarce resources, while the enterprise focuses on the combination of existing resources. . As enterprises gradually integrate into the IT innovation environment, because they have certain improvisational development capabilities, the resetting of scarce resources is highlighted, and the ability to integrate existing resources and the development of scarce resources exist simultaneously in the enterprise. At the time of enterprise business expansion, enterprises no longer meet the opportunities brought by content IT innovation to enterprise development. Enterprises are taking the initiative to develop new IT technologies independently. The ability of enterprises to face impromptu behavior no longer seems so urgent, but instead It is important for companies to combine and reset existing resources and scarce resources.

Research limitations/ Implications: The main theoretical contributions of the research are pointing out the different types of IT innovation and its evolution, identifying the two types of resource patchwork in the IT innovation process and the two capabilities of organizational improvisation, and exploring resource patching and organizational improvisation from the context of IT innovation. Relationship. In previous studies, there were also discussions about the relationship between resource patchwork and organizational improvisation. Although there were different opinions, most of them did not focus on the influence of situational changes on the two. In this study, we focus on the relationship between resource patchwork and organizational improvisation by fixing the

situation to enterprise change triggered by IT innovation. Affected by different types of IT innovations, the relationship between resource patchwork and organizational improvisation also changes dynamically. At the same time, as the enterprise is familiar with the changes caused by IT innovation, the degree of organizational improvisation affects the enterprise, and the resources are patched together. The degree of influence on enterprises has increased.

The management significance of the research is to summarize the successful experience of transformation in the context of retail enterprise IT innovation, and to provide new strategic options for other enterprises to cope with IT transformation. In the face of a complex and ever-changing external environment, should companies take the initiative, especially in today's fast-changing IT technology, how companies can transform themselves through IT technology. From exploration to integration to expansion, companies should choose different strategies when they transform through IT innovation. At first, they choose to wait and see, see the market changes; then gradually integrate and open the road of personalization; finally, become passive and take the initiative to become The leader of IT innovation.

Keywords: IT innovation ; resource bricolage ; organizational improvisation ; turbulent environments ; case study

Research on Regional Collaborative Innovation Platform Based on platform theory——With Nanning high tech Industrial Development Zone

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ABSTRACT

Purpose/Research Question:

With the concept of "Internet+" penetrating into multi-screen network across the platform, the network platform economy is increasingly prosperous. The platform economy has become a new economic model in the twenty-first century. The prosperity of the platform economy has given birth to a batch of network economic platform. These network economic platform achieve self-upgrading by competing with each other, and promote the ever-changing society by cooperating with each other.

Regional industrial Collaborative Innovation platform plays an important role in the process of industrial structure adjusting and economic development pattern transforming. This article, based on platform theory, analyzes a specific pattern of the role of government in promoting regional industrial development and holds that all kinds of industrial parks are a platform to attract economic agents to investment and internalize their externalities through supplying services. Instead of viewing government as an exogenous variable, this article handles government as an endogenous variable which should focus on core capacities and knowledge innovation to realize

mutual growth of industries and government. Nanning high tech Industrial Development Zone is analyzed as an example to illustrate these arguments. This article is supposed to be helpful in making of industrial policies and improvement of government functions. "Internet plus" is a new format innovation under the development of the Innovation 2.0, it uses the Internet platform and the traditional industry to make a deep integration to create a new development ecology, that is to make full use of the Internet to optimize the allocation of resources in the community and integrated function, then innovation will be the integration of the Internet in the depth of the economic and social fields, enhance social innovation and productivity, a wider range of Internet based tools for the realization of economic development in the new form.

Innovation 2.0 in the Internet plus environment, is an adaptation of the knowledge society, user centric, social practice as the stage, mass innovation, common innovation, open innovation for the characteristics of the users to participate in the innovative form. Government, universities, research institutions and users are the four main bodies of the mode of Innovation 2.0. They are especially important for open innovation of the first main body enterprise. However, in the five main collaborative innovation process, due to personal opportunism, limited rationality, asset specificity, uncertainty of external environment, information asymmetry and other factors, often lead to cooperation in the interests of both sides is not harmonious, and increase transaction costs, hinders innovation and ongoing activities. Therefore, we need to optimize and improve the traditional collaborative production and research activities mode, build a new cooperative R & D organization, create a new platform for collaborative innovation, and improve the efficiency and quality of collaborative innovation. In this paper, combined with the enterprise Internet plus environment innovation requirements, analysis of political research with five major parts in the collaborative innovation in motivation and interests, combined with the relevant innovation platform case, focusing on political research with collaborative innovation platform construction and operation mechanism research.

Key literature Reviews:

1. Open innovation.

In 2003, Henry W. Chesbrough put forward the concept of "open innovation" for the first time in the book "Open innovation: the new imperative for creating and profiting from technology". Today, open innovation has become a hot issue in the field of innovation management. Open innovation refers to the innovation factor exchange relationship which is closely related to the external environment while the enterprise innovates itself, and covers the value innovation of technological innovation, mode innovation, management innovation, system innovation and so on. The main modes of open innovation include: (1) introverted innovation that is the open innovation within the organization, which is manifested in the whole staff participation within the organization, fully mobilizing the internal resources, and organizing the innovative modes closely linked and closely

cooperated among all departments. (2) integrated innovation, that is the excellent innovation team or project outside the organization, which involves the external innovation mode of obtaining the latest technological resources in different fields. (3) platform based innovation, that is building an open innovation platform, coordinating and coordinating internal staff and external stakeholders, through the establishment of platform, truly achieve the synergy innovation mode of internal and external interaction and sharing.

2. Platform theories

Platform theory is a new topic, and scholars in China have different interpretations of the definition of this concept. Xu Jin believes that: "Platform is essentially a trading space or place, which can exist in the real world or in virtual network space. This space guides or facilitates transactions between two or more customers." And strive to attract the parties to the transaction to use the space or place by charging appropriate fees. In order to maximize the interests. Platform economics, with this concept as its core, emphasizes the multilateral market model of multi-supply, multi-demand and multi-platform trading. Guhong believes that "platform is an interactive space based on mass endpoints and general media, which can promote collaboration and interaction between mass endpoints through certain rules and mechanisms." This concept is based on the subversion of the traditional mode of information dissemination. Both concepts reveal the basic functions of the platform: aggregation, coordination, reorganization and interaction.

3. Platform Characteristics of Regional Collaborative Innovation Platform

As a special kind of platform, regional collaborative innovation platform not only has the general characteristics of the platform, but also has its own characteristics. Platform is a real or virtual place, which maximizes revenue by guiding both parties or multi-parties to trade and charging appropriate fees. In fact, the platform in reality is no longer a unilateral market composed of the transaction relationship between upstream suppliers and downstream demanders, but a bilateral or multilateral market composed of two or more types of users through the platform to achieve the coordination of supply and demand. The essence of the platform is to provide an open public system with certain functions, and to provide common services to bilateral or multilateral access platforms. In theory, platform research is closely related to asymmetric pricing, network externalities and platform-to-platform competition. The basic feature of regional collaborative innovation platform is to provide unified and common hardware infrastructure and software infrastructure services for the economic entities stationed in the platform. The economic entities in the platform achieve common development through mutual cooperation and trade. Regional collaborative innovation platform has distinct platform characteristics in attracting enterprises to enter and promoting the development of industrial clusters. Next, the paper elaborates the platform characteristics of industrial park from asymmetric pricing and platform access, network externality and platform competition, and gives the spatial agglomeration, complexity and platform of the park. Nesting and other special properties.

Research design / Research methodology / Approach

This article, based on platform theory, analyzes a specific pattern of the role of government in promoting regional industrial development and holds that all kinds of industrial parks are a platform to attract economic agents to investment and internalize their externalities through supplying services. Instead of viewing government as an exogenous variable, this article handles government as an endogenous variable which should focus on core capacities and knowledge innovation to realize mutual growth of industries and government. Nanning high tech Industrial Development Zone is analyzed as an example to illustrate these arguments.

(Expected) Findings/Results:

The ability cultivation and knowledge innovation of government management platform used to regard the government as an exogenous variable in the analysis of government innovation policy. Its ability and knowledge to formulate innovation development policy, support industrial operation system are assumed to be unchanged. The development of regional innovation platforms regards the government as an endogenous variable. The ability and knowledge of the government to support innovation development are gradually learned and accumulated in the process of practice, which is dynamic. The realization of the goal of regional collaborative innovation platform requires the government to carry out knowledge innovation and institutional innovation like enterprises to enhance the advantages of platform competition among regions. In the actual operation of industrial parks and high-tech zones in China, path dependence, institutional inertia, low-end lock-in, homogeneous competition and other phenomena are relatively common. Starting from the point of view that the government provides economic public goods for the realization of regional economic development, this paper extracts the economic perspective of service provision and income return, finds the theoretical significance of regional collaborative innovation platform, and does not deny the basic function of the government in providing public goods to improve social welfare. Further research needs to shift the focus from platform development to platform operators, analyze the training of their platform innovation management ability, the management and innovation of relevant knowledge. The diversity of service provided by platforms, the competition between platforms among regions and the multi-attribute access of enterprises on different types of regional innovation platforms according to the different technological characteristics of industrial chain links are also the contents that need further study.

Research limitations/ Implications:

Although much progress has been achieved in this paper, we can't deny that there is still some shortcoming in this paper. This study also has some shortcomings, and the operation mechanism involved is not perfect. Because the platform involves multiple parties' participation, the behavior

of market players needs further research, so the practice stage is uncertain. In the next research, we will continue to make up for the lack of research, analyze the effect of different innovation subjects on different operation mechanisms, and explore a more complete innovation mode.

Key word: platform theories; Regional industrial Collaborative Innovation platform; government capacity and knowledge; Industrial Park

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What Dynamic Managerial Capabilities Are Needed for Greater Strategic Alliance Performance in the IT Industry?

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Abstract

Purpose/ Research Questions

The aim of the paper is to provide an overview of dynamic managerial capabilities that are needed for greater single and portfolio alliance performance. The object of the research is IT companies providing software and hardware solutions in the United States. Unit of research is selection criteria using by the Board of Directors in the hiring process of strategic alliance directors. This paper aims to address the following research questions. What are the most important dynamic managerial capabilities employers seek when hiring a new director of strategic alliances? What are dynamic managerial capabilities needed for greater alliance performance in each phase of the alliance life cycle? Research questions were answered empirically by means of the contextual content analysis of job vacancies of strategic alliance director positions on the LinkedIn platform in 2018.

Key Literature Reviews

Hiring right executives these days is like hitting a double moving target. How are organizations to judge the relevance of a candidate's managerial capabilities to the increasingly competitive global world? The sustainable competitive advantage of a firm may lie in the firm's ability to exploit its current competencies while simultaneously exploring new capabilities (Chen et al., 2013). Leadership in strategic management is also a key factor in enhancing innovation (Kim & Choi, 2018). Adner and Helfat (2003) introduced and defined dynamic managerial

capabilities (DMC) as those "capabilities with which managers build, integrate, and reconfigure organizational resources and competences". They propose that DMC is rooted in several underlying factors that separately and in combination, influence managers' strategic and operational decisions: managerial human capital, managerial social capital and managerial cognition. Managerial human capital refers to skills learned that require some investment in education, training or learning more generally (Becker, 1964). Similarly, managers acquire knowledge, develop expertise, and perfect their abilities in part through prior work experience. Managerial social capital results from social relationships and can confer influence, control, and power (Adler and Kwon, 2002). Social capital also may help to transfer information from one setting to another. Managerial cognition refers to managerial beliefs and mental models that serve as a basis for decision making (Walsh, 1995). In early research, March and Simon (1958) and Cyert and March (1963) argued that the cognitive base for decisions consists of knowledge or assumptions about future events, knowledge of alternatives, and knowledge of consequences of the alternatives. All three elements of DMC are intertwined. Furthermore, leaders differ in their response on triggers and therefore on the impact on strategic change and firm performance. These differences in managerial cognition, social capital, and human capital lead to different performance outcomes (Helfat and Peteraf, 2015). However, little research on leaders has analyzed these three factors together (Verbeke et al., 2017). Current empirical research is focusing on these three factors together. The paper potentially can "fill the gap" by means of exploration three factors together answering exploring what DMC board of directors seek when hiring new strategic alliance directors. The academic literature suggests that the term "strategic alliances" includes a wide array of organizational forms ranging from long-term purchasing agreements to co-marketing and licensing agreements, to R&D collaboration teams, to joint ventures (Spekman et al., 1998). Corte argues that "today the firm is a core of a network of interactions with different actors at more levels, of different sizes and strategic approaches" (2018, p.10). Grosse et al. (2018) argues that that most of the innovative ideas emerged in collaboration with others. Strategic alliances also give access to obtain innovation-creating knowledge (Yoo et al, 2018). However, the integration of the two (or more) organizations poses a critical knowledge management problem for the new organization to tackle in going forward (Edwards, 2010). Although all companies seemed to create some value through an alliance, certain companies showed themselves capable of systematically generating more alliance value than other by building dedicated strategic-alliance function. How do they do it? The companies appoint a vice president or director of a strategic alliance with his or her own staff, resources and capabilities. Enterprises with a dedicated function achieved a 25% higher long-term success rate with their alliances than those without such a function – and generated almost four times the market wealth whenever they announced the formation of a new alliance (Dyer et al., 2001). Therefore, directors of strategic alliances in a firm are the primary repository of useful alliance management experience and dynamic managerial capabilities gained from prior or current alliance experience. As such, what "alliance capability" or dynamic managerial capabilities employers seek, select and hire? Alliance management is, in the early phase of the alliance, visioning and sponsoring. It requires first the formulation of the alliance idea, followed by its articulation, which helps the firm recognize the potential benefits of the alliance. As the alliance begins, alliance management focuses on advocating for the alliance to important stakeholders, and networking within and across companies to secure the commitment and participation of key organizational actors. As the alliance becomes viable, alliance management is concerned with managing and overseeing the operation of the ongoing alliance in addition

to mediating conflicts between partners which can occur through the alliance's normal growth and decline. If so, what are the most important dynamic managerial capabilities needed for each alliance life cycle phases?

Design/ Methodology/ Approach

The objects of the research are IT companies providing software and hardware solutions in the United State. The homepage LinkedIn provides sectors the jobs adverts which can be categorized. To narrow the job adverts down to the IT sector we have chosen the topics: "IT and Services" and "Computer Software". We have chosen IT industry and US market because they represent the place where "innovation plays a critical role in predicting the long-term survival of organizations, determining an organization's success and sustaining its global competitiveness, especially in an environment where technologies, competitive position and customer demands can change almost overnight and where the life-cycle of products and services are becoming shorter" (Yusr, 2016, p.1). The unit of research is selection criteria using by employers in the hiring process. Balancing practical considerations against statistical power and generalizability, we adopted Roscoe (1975) suggestions, that in most ex-post facto research, samples of 30 or more are recommended. Sekaran and Bougie (2009) agree that sample sizes larger than 30 and less than 500 are appropriate for most research in social science. The sampling period is six months that correspond to good research quality (Harper, 2002). All job vacancies (n=50) were available on the LinkedIn platform within one month in February (n=22) and in July of the 2018 (n=28).

To answer the first research questions, we did the contextual content analysis of all available job vacancies (n=50) of the strategic alliance director position on LinkedIn. A central idea of content analysis is that "many words of text can be classified into much fewer content categories" (Weber, 1990, p.7). Typically relying on archival data to extract criteria of interest to strategic management scholars, content analysis has aided in analyzing corporate strategies (Bowman, 1978), organizational boundaries (Fiol, 1989), new product development (Simon and Houghton, 2003), organizational resources (Mishina, 2004), strategic groups (Osborne et al., 2001), and joint ventures (Merchant, 2004). Any source of communication such as shareholder letters, interview narratives, speeches, or transcripts from recorded meetings of executives or even job adverts could be used by a strategy researcher as an effective data source for content analysis. The capabilities of a strategic alliance director investigated through the analysis of job vacancies in the Information Technology sector in the United States. The data accounted for 50 job descriptions from the job market web side of LinkedIn. We analyzed all job adverts related to the position of the strategic alliance director. When we were reading the job adverts, we recognized whether the position was related to strategic alliances or not. Even though some titles are sometimes misleading and not all positions were exactly called "Strategic Alliances Director", the tasks and responsibilities were most of the time similar or even the same. The introduction, qualification, and responsibilities of jobs adverts were equally analyzed. If the phrases or keywords were listed frequently and could be explained as dynamic managerial capabilities, we added them to the list. Other phrases/keywords such as "good work ethic" were neglected because of the difficulty to define the keyword. We determined the selection criteria using by employers in the hiring process as the unit of analysis. Having analyzed the job descriptions by means of keywords and key phrases, we have classified components of required managerial capabilities into three equivalent categories: managerial human capital; managerial social capital and managerial cognition. Then, having used frequency of an occurrence of components of dynamic managerial capabilities we have determined the relative importance of each component in a jobs' descriptions. Therefore, three

clusters of components of dynamic managerial capabilities were classified: most important, important and less important. After the classification, we have answered the first research question. To answer the second research question, we have classified components of managerial human capital, managerial social capital, and managerial cognition into three phases of the alliance development and then using the frequency of an occurrence we determined the relative importance of each capability for each alliance's phases.

Findings/Results

To specify distinctive semantic features of each category we have used the most recent research findings of Salvato and Vasollo (2018) on the source of dynamism in dynamic capabilities and research note and commentaries of Kor and Mesco (2007) on configuration and orchestration of top executive' capabilities and the firm's dominant logic. We classified selection criteria (n=30) into three categories: managerial human capital; managerial social capital and managerial cognition. Then, we used the frequency of an occurrence to determine the relative importance (more important; important; less important) of each component of dynamic managerial capabilities in job's offerings. *More important capabilities* are met in two-thirds of job adverts and even higher. *Important capabilities* are met just under two-thirds of the job adverts and just over one third. *Less important capabilities* are met in less than one-third of job adverts. The number of found dynamic managerial capabilities are 30. The number 30 was due to the capabilities that we could take from the job adverts. These had to occur several times and the keyword/phrases must be able to interpret and to define. There are 10 components were accounted for the category of being most important out of the 30 components of dynamic managerial capabilities, while next 9 components were categorized as important and last 11 components being less important. We codified managerial cognition in "MC" letters; managerial social capital in "SC" letters, and managerial human capital in "HC" letters. Having used the frequency of an occurrence of capabilities in all available job vacancies (n=50) on the LinkedIn platform, we have answered the first research question. *The most important* dynamic managerial capabilities ($n \geq 33$), which employers seek in the hiring process of new strategic alliance director is *managerial cognition* (MC=6): individual cognitive frames which learned from past experiences that allow the frame-breaking changes that creative leaders suggest or environmental discontinuities require. Next important dynamic managerial capabilities ($33 < n \leq 17$) of new strategic alliance leader are managerial *social capital* (SC=6): a dense web of interrelated actions supported by productive dialogue and leads to behavioral integration in upper echelons of an alliance. Less but still important dynamic managerial capabilities ($n \leq 16$) are *managerial human capital* (HC=5), which are shaped by their education and personal and professional experience.

To answer a second research question, we have classified components of managerial human capital; managerial social capital and managerial cognition into three phases of alliance's life cycle and then use frequency of an occurrence we determined the relative importance of each classified components of capabilities in each phase of alliance life. We have adopted and extended the construct of Kale and Singh (2009) on key success factors of a *single alliance*. When it comes to *portfolio alliances*, "very few academics have paid attention to it. In practice too, the portfolio approach to alliance strategy and management is still in its infancy. This implies that most firms still focus mainly on each individual alliance" (Kale and Singh, 2009, p.57). If we were there, we have adopted and extended the construct by Hoffman (2007) propositions on three phase of alliance portfolio development: adapting strategy, shaping strategy and stabilizing strategy. Finally, we adopted three process dimensions of alliance portfolio management capabilities published by Sarkar et al. (2009): partnering proactiveness,

relational governance, and portfolio coordination. Having used the frequency of an occurrence of capabilities in each phase of the alliance life cycle, we have answered the second research question. The results of the research are as follows.

The most important dynamic managerial capabilities for *alliance formation and partner selection phase* are *managerial social capital* (SC=4), particularly, ability to build the relationship, demonstrate cultural fit and willingness to travel, and demonstrate strong negotiation skills. Very important dynamic managerial capabilities for alliance formation and partner selection are managerial human capital (HC=3): strong communication and organization skills as well as new leaders' international experience. Finally, it is very important, for the first phase of the alliance life cycle, managerial cognition (MC=3), particularly the capabilities to seek new partnership, past strategic planning experience, and creativity.

The most important dynamic managerial capabilities for *alliance governance and design phase* are again *managerial social capital* (SC=4), namely, capabilities to build robust internal connection, to work with internal and external alliance members and to building the robust internal connection. Managerial human capital (HC=3) is very important in this phase of the alliance life cycle, notably, new strategic alliance directors should demonstrate effective leadership, contractual agreement responsibility and be able to recruit right people in right time. Managerial cognition (MC=2) is also important in this phase of the alliance life cycle, namely financial acumen and ability to manage the strategic partnership.

For *post-formation alliance phase*, the most important dynamic managerial capabilities are *managerial cognition* (MC=6), namely, capabilities to handle uncertainty and ambiguity, complex problem-solving, be as a critical thinker, manage sales, and drive revenue. It corresponds with research findings of Rosha and Lace (2018): to be effective in mature business, leaders must be proficient in formal planning, organization, and administration. Managerial human capital (HC=4) become very important in this phase of an alliance life cycle, namely, demonstrate the ability to manage conflict, teaching capability, gather final lessons learned, update knowledge base and continuously improve (documentation and recording). Managerial social capital (SC=2) is less important in this phase in terms of occurrence in job adverts, but it's still very needed due to the capability to influence others and effectively and efficiently to work across various function group. Thus, we have answered the second research question.

Research implications/limitations

There are several theoretical and practical contributions to the research. We found that when employers hire a new strategic alliance director, the most important dynamic managerial capabilities, which they seek in the hiring process of leader are a *managerial cognition*, namely, capabilities that allow the strategic changes that creative leaders suggest or environmental discontinuities require. Next important dynamic managerial capabilities of the new strategic alliance leader are managerial social and intellectual capital, that is a dense web of interrelated actions which leads to behavioral integration in upper echelons of alliance what employers seek. Less but not least important dynamic managerial capabilities are managerial human capital, which is shaped by candidates' education and their personal and professional experience. When it comes to the contribution for practitioners, our research findings evidence that *managerial social capital* is more important within two first phase of alliance development, namely, for *formation and selection phase* as well as for *governance and design phase* of the alliance life cycle. Respectively, *managerial cognition* becomes the most important capability in the *post-formation phase* of the alliance's life cycle.

There are several strong limitations of the current research. The scope was limited for IT companies located in the United States. The capabilities of the strategic alliance director might differ in other industries. We didn't discuss the advantages and disadvantages of job vacancies on LinkedIn in the opposite to face to face interviews. We discussed dynamic managerial capabilities regarding single alliances type and alliance portfolios. However, specific dynamic managerial capabilities focusing on *meta-multinationals* (Lessard et al., 2016) *alliance portfolios* are not considered and, therefore, there is a need for further research. The data sample is relatively small ($n=50$) and therefore, the more robust analysis is needed. Through the small data size and missing validation through a lack of robust analysis, the current paper serves more as an introduction to the research, than as the results. Therefore, our research raises several opportunities for future research, both in terms of theory development and findings validation.

Keywords: Dynamic managerial capabilities; alliance development phase; strategic alliance director

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13.

Digital Maturity and Corporate Performance: Case of Baltic States

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Abstract

The purpose of the paper is to conduct an analysis of digital maturity of Baltic public companies. Digitalization is inevitable due to rapid development of technologies, every individual, business and government become a part of new digital era (Lee, M. et al., 2018; Kodama, F., 2018). For being able to survive in modern economy, companies and governments have to move towards digitalization applying innovative solutions. The digitalization processes accelerate development of all industries by making them connected, fast and controllable, also providing easy access to data and necessary information (Shim, S. O., Park, K., & Choi, S., 2018). As it was defined in the report "Measuring industry digitalization" the digitalization is the pervasive adoption of a wide variety of digital, real-time and networked technologies, products, and services that will enable people, companies, governments, and even machines to stay connected and communicate with one another, gathering, analyzing and exchanging massive amounts of information on all kinds of activities (Friedrich, Merle, Gröne, & Koster, 2011, pp. 5-6). The concept of Digital transformation recently

became a popular term, the most detailed definition of this concept was proposed by D. Schallmo, C. A. Williams & L. Boardman gathering several definitions of other authors. The Digital transformation (DT) framework includes the networking of actors such as businesses and customers across all value-added chain segments and the application of new technologies. As such, DT requires skills that involve the extraction and exchange of data as well as the analysis and conversion of that data into actionable information. This information should be used to calculate and evaluate options, in order to enable decisions and/or initiate activities. In order to increase the performance and reach of a company, DT involves companies, business models, processes, relationships, products, and other (Schallmo, Williams, & Boardman, 2017, pp. 1740014-4). For some companies, digital transformation may become challenging, according to Deloitte report on chemical industry "Global digital chemistry" the main barriers to DT among 11 chemical sector companies are organizational agility (55%) and flexibility (39%) (Deloitte, 2016, p. 4). Successful DT may bring such benefits as greater customer insight and reach, higher productivity, and creation of new business models (Friedrich, Merle, Gröne, & Koster, 2011, p. 5).

Scientific literature suggests such term as Digital maturity, which describes willingness and ability of the company to change and apply innovative technologies depending on the trends, in order to remain competitive in the market. According to Deloitte and MIT Sloan management digital maturity is about adapting the organization to compete effectively in an increasingly digital environment, therefore, it is continuous and ongoing process (Kane, Palmer, Phillips, Kiron, & Buckley, 2017, pp. 5-6). Digital technologies provide wide benefits and opportunities in optimization of operational activities and therefore increase competitive advantages. As it was mentioned DM is a continuous process that is why changes towards maturing are also continuous and systemic.

Digital maturity became an integral part of development strategies for both businesses and governments. This concept is studied by various commercial and governmental organizations. If companies' researches are aimed at the cost reduction and profit maximization, governmental analysis of DM is conducted to identify strengths and weaknesses of the country, gaining insights into industries that need to be upgraded the most, to improve the results of overall growth.

Based on the analysis of scientific papers and researches reviewed by the author, the following hypothesis is put forward and will be tested:

H1: There is a positive trend in digital maturity of Baltic public companies.

In order to evaluate digital maturity level of Baltic public companies, the official reports of companies included in Baltic main list of Nasdaq were analyzed for 5 year period. Nasdaq CSD SE (Societas Europea) is the regional central securities depository in the Baltics, with a business presence in Estonia, Latvia and Lithuania. Baltic main list includes companies listed on the Tallinn, Riga and Vilnius stock exchanges, which have at least 3 years of operating history, not less than EUR 4 million of market cap and a free float of 25% or worth at least EUR 10 million (Nasdaq, 2018). At the moment of the research there were 31 blue-chip companies in the Baltic main list.

Data analysis was conducted through NVIVO 12 and Microsoft Excel software. The key semantic fields were defined while literature analysis of scientific articles. There are 6 groups of key words, as

follows: general, internet of things, data science, process automation, artificial intelligence, online. All reports were analyzed separately in order to see statistics per each company for every year. In Microsoft Excel correlation coefficient for received data from NVIVO 12 and financial indicators was calculated, in order to understand relationship between these sets of variables. The following financial indicators are used for correlation analysis:

Sales Growth: Indicates change in Sales revenue over certain period of time.

EPS Growth: Indicates change in the amount of income earned during a period per share of common stock (Institute CFA, 2017, pp. G-11).

ROE: Profitability ratio, which refers to return earned by a company on its equity capital (Institute CFA, 2017).

Gross Profit/Assets: It is calculated as revenue minus cost of goods sold divided by total assets. This ratio indicates whether or not the firm's assets are profitable (Bajkowski, 2013).

Gross Profit Margin: Profitability ratio, which represents percentage of revenue available to cover operating and other expenses, and to generate profit (Institute CFA, 2017).

Operating Profit Margin: Ratio indicates how much profit a company makes after paying for variable costs. It is also expressed as a percentage of sales and then shows the efficiency of a company controlling the costs and expenses associated with business operations (Institute CFA, 2017).

Net Profit Margin: Profitability ratio, which shows the percentage of actual profit in every unit of revenue (Institute CFA, 2017).

TSR: The total shareholders' return measures the combined return from change in stock price and dividends (Accountingverse, 2018).

The trend lines reflect the positive tendencies over the period 2013-2017 in Latvia, Estonia and Lithuania. Analysis gave insights into digital maturity of Baltic states and IT-related concepts discussed by the public companies. It is possible to state that H1 should be accepted.

To gain a deeper understanding of the role of digital maturity for public companies, the research included correlation analysis of corporate digital maturity and corporate performance. There is a positive correlation between digital maturity and company's sales growth and ROE, stating that improvements in digital status provide new distribution channels for sales, which in turn leads to positive changes in revenue. New tools on promotion, marketing analysis, and new communication channels with clients can vastly increase sales and support sustainable enlargement of the market share. In addition, positive correlation with return on equity and gross profit over assets, shows that digital maturity allows to at least partially increase the profitability of the invested capital. However, market is not managing to respond fast, therefore there is a negative correlation with shareholders' return, since the digital maturity is not yet realized completely in companies net earnings and in their total return.

Keywords: digitalization, digital maturity, Baltic public companies, performance

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14.

OPEN INNOVATION AND SIMULATION IN LIFE-SCIENCE STARTUPS

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Abstract

Purpose/ Research Question:

This research is about the innovation performance of life science spin-offs in Germany.

- Which causal conditions are necessary or sufficient to explain innovation performance in academic spin-off in life science?
 - Innovation performance =

- innovation speed or
- innovation success
- Does *open innovation* play a role in explaining innovation performance
- Does the *use of advanced simulation technologies* play a role in explaining innovation performance

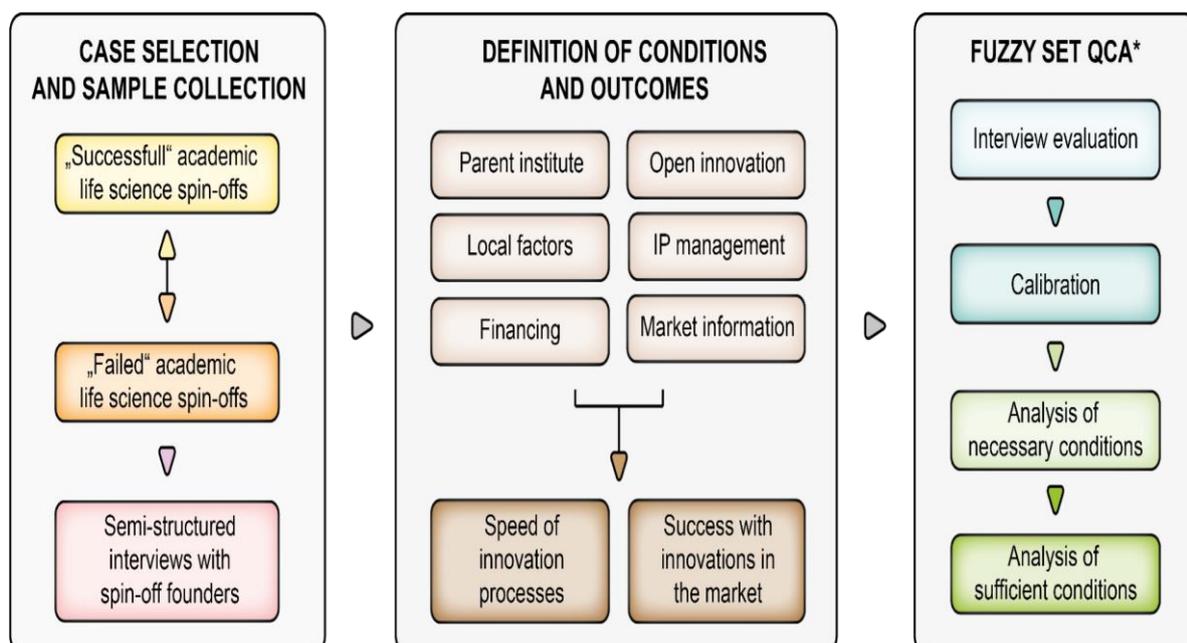
Startups and Open Innovation – Issues in the Literature

Networks and open innovation may be important for the success of startups or spin offs as networks are considered the driver for innovation (Gübeli & Doloreux (2005); Spender et al. (2017)).

It is not only other firms but also support structures (such as *incubators*) that interact with startups. Each one of the partners for interaction has a different role (Markman et al. (2005); Spender et al. (2017)).

Location in terms of the entrepreneurship ecosystem and its access to resources (esp. *financial resources*) affect startup performance (Frazer et al. (2015); Spender et al. (2017)).

Methodology



*performed with QCA package for R

Findings: Sufficient conditions for high innovation speed

Calculation of the different paths of conditions sufficient for a high innovation speed in the tested spin-offs (N=51) are based on a Quine-McClusky algorithm. The lower limit for the consistency was set to 0.8. **Top:** Complex solution of sufficient conditions.

Bottom: Minimization of the complex solution to a parsimonious solution

Complex Solution	Consistency	Raw Coverage	Unique Coverage
PARENT*LOCAL*FINANCE*MARKET	0.894	0.627	0.048
PARENT*LOCAL*FINANCE*patent*MARKET	0.853	0.635	0.024
FINANCE*patent*open*MARKET	0.847	0.619	0.012
PARENT*LOCAL*OPEN*patent	0.822	0.707	0.036
FINANCE*OPEN*PATENT*MARKET	0.819	0.563	0.010
PARENT*LOCAL*PATENT*market	0.814	0.579	0.012
Total	0.834	0.802	-

Parsimonious Solution	Consistency	Raw Coverage	Unique Coverage
PARENT*LOCAL	0.815	0.854	0.023
FINANCE*MARKET	0.729	0.835	0.012
Total	0.814	0.802	-

Findings: Sufficient conditions for high innovation success

Calculation of the different paths of conditions sufficient for a high innovation success in the tested spin-offs (N=51) are based on a Quine-McClusky algorithm. The lower limit for the consistency was set to 0.8. **Top:** Complex solution of sufficient conditions.

Bottom: Minimization of the complex solution to a parsimonious solution

Complex Solution	Consistency	Raw Coverage	Unique Coverage
PARENT*LOCAL*FINANCE*OPEN	0.892	0.707	0.024
LOCAL*FINANCE*OPEN*PATENT	0.871	0.613	0.012
PARENT*FINANCE*OPEN*MARKET	0.856	0.674	0.036
PARENT*LOCAL*FINANCE*patent*MARKET	0.848	0.635	0.072
PARENT*LOCAL*OPEN*market	0.822	0.687	0.024
Total	0.862	0.813	-

Parsimonious Solution	Consistency	Raw Coverage	Unique Coverage
LOCAL*OPEN	0.854	0.771	0.122
PARENT*FINANCE	0.814	0.660	0.091
Total	0.825	0.804	-

Research Limitations

The research currently focuses on German life science spin-offs in a rather particular setting: the embedding in a life science incubator.

The analysis bases on the information collected through interviews and on sectoral

knowledge of the first author (UM).

Analysis of how simulation technologies affect innovation performance yet to be done.

Keywords:

Academic entrepreneurship, life science, open innovation, configurational methods

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15.

The future of AI in Europe: learning from China towards mission-oriented social innovation strategies

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Gianluca Misuraca

Researcher/M.A., EC Joint Research Centre JRC, Seville, Spain

Abstract

The presentation will provide an overview of the review of the state of the art of the use of Artificial Intelligence systems in European countries, and a comparison with China.

The focus will be on how data-driven simulation modelling can enable public sector innovation in complex welfare systems.

Building on previous research to propose the developing of a computational

simulation modelling based on ABM, the presentation will conclude outlining future research and policy implications towards mission-oriented social innovation policy.

Key Literature Reviews (About 3~5 papers):

European Commission (2016d). Social Policies as a Productive Factor. Brussels: European Commission, DG Employment, Social Affairs and Inclusion. Ares(2016)5531280 - 23/09/2016.

European Commission (2016b). 2016 European Semester: Country-specific recommendations. Brussels, COM(2016) 321 final/2.

Juncker J-C, (2014), A New Start for Europe: My Agenda for Jobs, Growth, Fairness and Democratic Change, page 8.
https://ec.europa.eu/commission/publications/president-junckers-political-guidelines_en

Mazzucato, M. (2015a). The Entrepreneurial State: Debunking Public vs. Private Sector Myths. London: Anthem Press. McKelvie, D., (2012). Envisaging Social Impact Bonds Modelling 'What Might Be' A Whole System Collaborative Approach, The Symmetric Partnership LLP.

Design/ Methodology/ Approach:

A number of methodologies and evaluation techniques will be applied. First of all, baselines data and benchmark indicators need to be identified where possible through review of literature and thematic analyses. The review of the state of the art provided a overview of the existing evidence. But this shall be further developed ad hoc and contextualised, looking at specific case studies and scenarios of use.

In fact, a crucial aspect for conducting the analysis of ICT-enabled social innovation initiatives and their contribution to social services reform is the availability of

sufficient and quality data. To this end, considering as clearly emerged in the review of the state of play the limited availability of data for measuring performance and impacts of initiatives in the social services domain in general and in social innovation in particular, raise the fundamental need of developing a systematic collection process to gather micro-data. These will be necessary for both analyzing impacts at micro level and to "feed" the simulation modelling required for assessing impacts at meso/macro level.

For this reason, the paper will suggest to start developing an online platform, which includes an interactive tool for data gathering. This shall permit to build a structured sample of initiatives from which also draw case studies and scenarios of use for testing some of the operational components. In the future, however, the possibility to further expand such data-collection process with a more data -driven approach shall be explored.

(Expected) Findings/Results:

Results could involve building a "knowledge repository of simulation models based on a portfolio of cases analysed as part of the development and further enriched with new application examples and scenarios of use across EU and in different policy domains. At the same time, it would require developing a fully-fledged dynamic electronic toolkit as a support to policy- makers for modelling and simulation in real-time of policies and programme interventions included in the knowledge repository. To this end current trends in the development of large scale computational modelling and systems simulation tools, able to capture not only predictable human behaviour through linear top-down forecasting techniques, but also unplanned outcomes of complex interactions taking advantage of data analytics and computer-based policy modelling shall be exploited.

Research limitations/ Implications:

- **Calibration** and **validation** issues demarcate the limitations of our research:
- The coupled model will get into contact with empirical data in at least three ways:
 - quantitative and qualitative empirical data is used to calibrate the model;
 - data is processed in simulation experiments for producing particular scenarios (sensitivity analyses, ex-ante evaluation)
 - Simulations produce artificial data, which need to be analysed and interpreted, and which need to be validated against empirical data

The quality of the coupled model and its results will depend on the access to data.

- **Utility for practitioners** might be a further issue demarcating limitations:
 - For the stakeholders to trust the model (and its results), they needed to
 - understand the mechanisms represented in the model
 - feel that they have had an input into the design of the agent rules and characteristics
 - agree that the model outcomes are sufficiently close to what they observed actually happening

Keywords: innovation management, knowledge-based systems, artificial intelligence, agent-based models, simulation experiments

Reference:

Misuraca, G., Centeno, C., & Torrecillas, C. (2014). Measuring the Impact of eInclusion Actors. Impact Assessment Framework Main Report and Annex–MIREIA eI2-IAF Toolkit (No. JRC89462). Institute for Prospective and Technological Studies, Joint Research Centre.

Misuraca, G., Codagnone, C., & Rossel, P. (2013a). From Practice to Theory and back to Practice: Reflexivity

in Measurement and Evaluation for Evidence-based Policy Making in the Information Society. *Government Information Quarterly*, 30(1), S68-S82. doi: 10.1016/j.giq.2012.07.011

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in Measurement and Evaluation for Evidence-based Policy Making in the Information Society. *Government Information Quarterly*, 30, Supplement 1, S68-S82.

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Misuraca, G., Viscusi, G., (2015), Shaping public sector innovation theory: An interpretative framework for

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16.

Study on the business model of post-natal nursing institutions in Taiwan and China

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Pei-ling Liu(Corresponding author)

Graduate Institute of International Business Administration College of Business,
Chinese Culture University

Abstract Purpose/ Research Question:

From the perspective of management, it is necessary to develop the business model of high-end postpartum care institutions to meet the current market demand and at the same time conform to the operating benefits, so as to achieve sustainable development of the institutions.

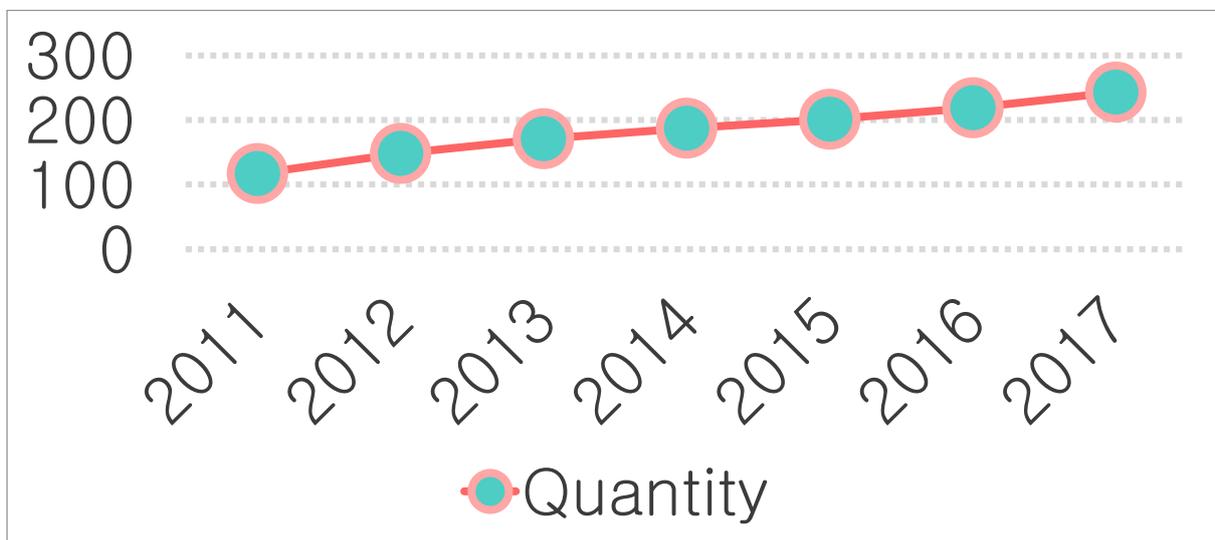
Investigation on business operation mode of high-end postpartum care institutions

across the Taiwan straits.

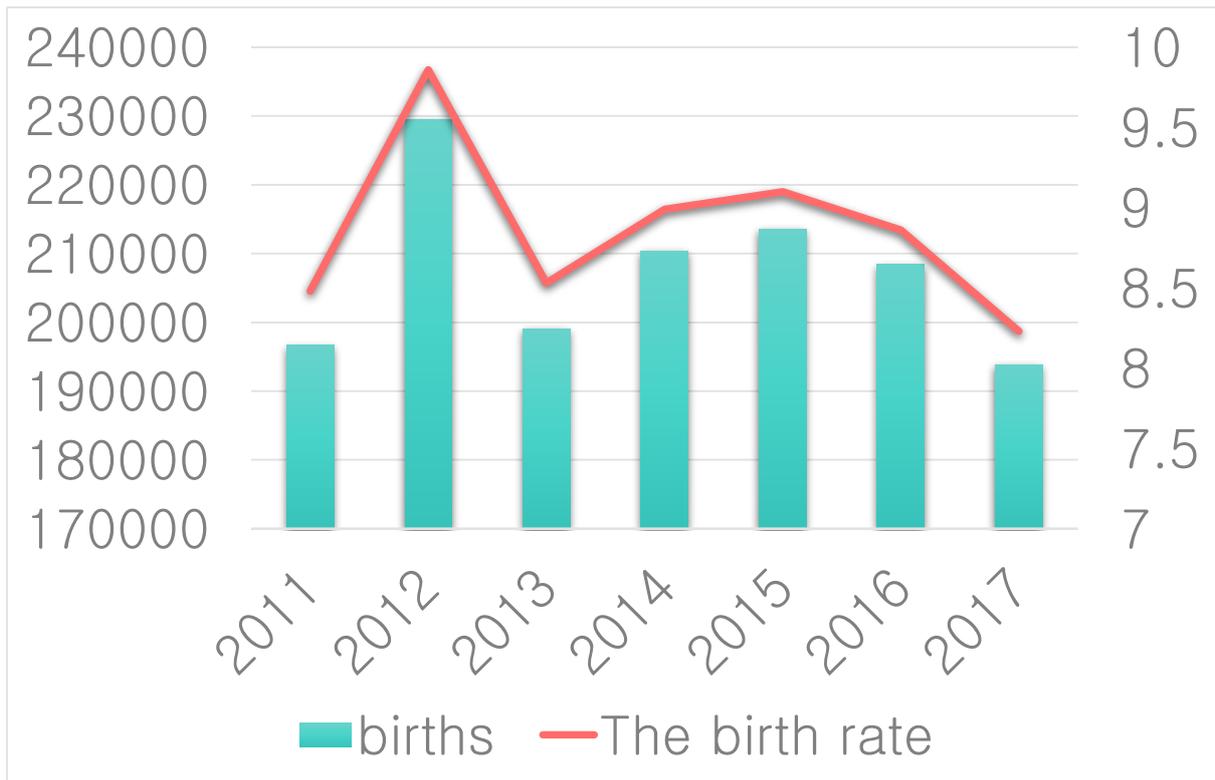
Use the Business Model Canvas to present the Business operation mode of postpartum care institutions.

How to form a sustainable positive feedback loop is discussed by using the theory of system thinking and the concept of positive feedback loop of system base mode.

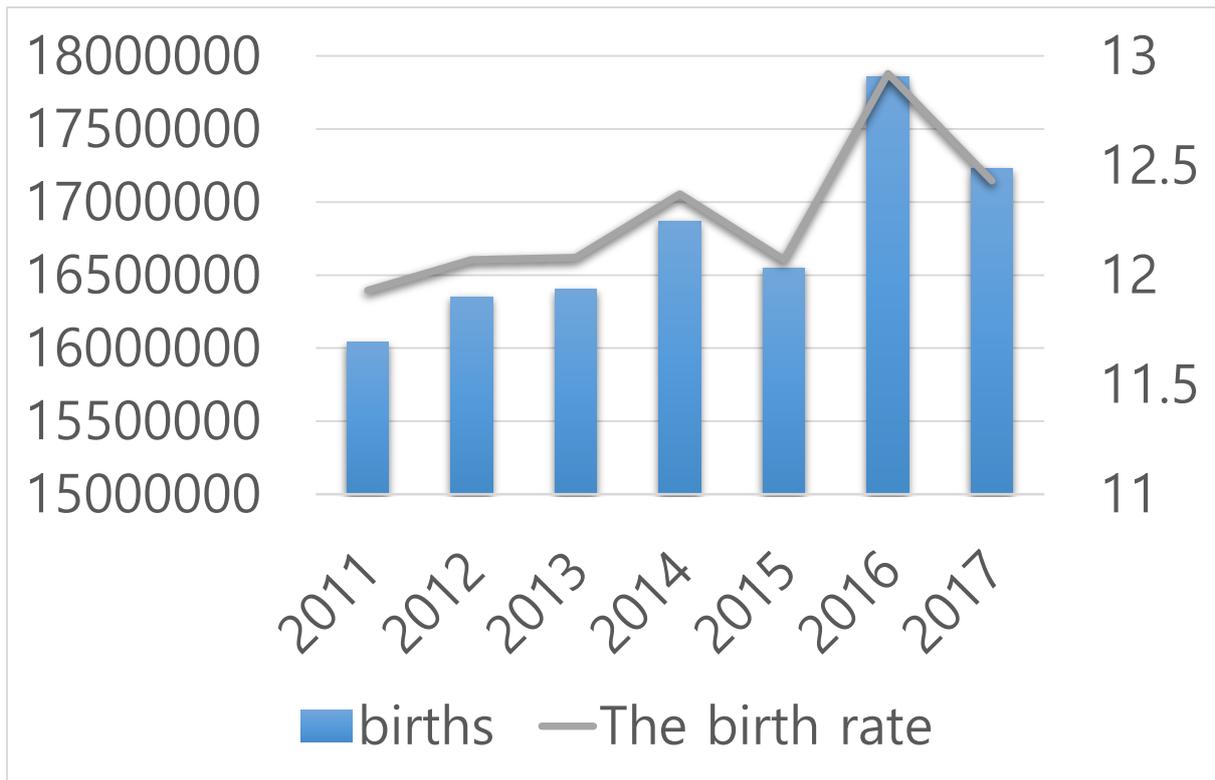
Taiwan(Number of post-natal care homes)



Taiwan (Births/The birth rate)



China (Births/The birth rate)



Industrial business model(Taiwan)

model	type	instructions	Care mode	staff
Independent model	Single building	Independent entrance	Centralized care	Nurse, babysitter

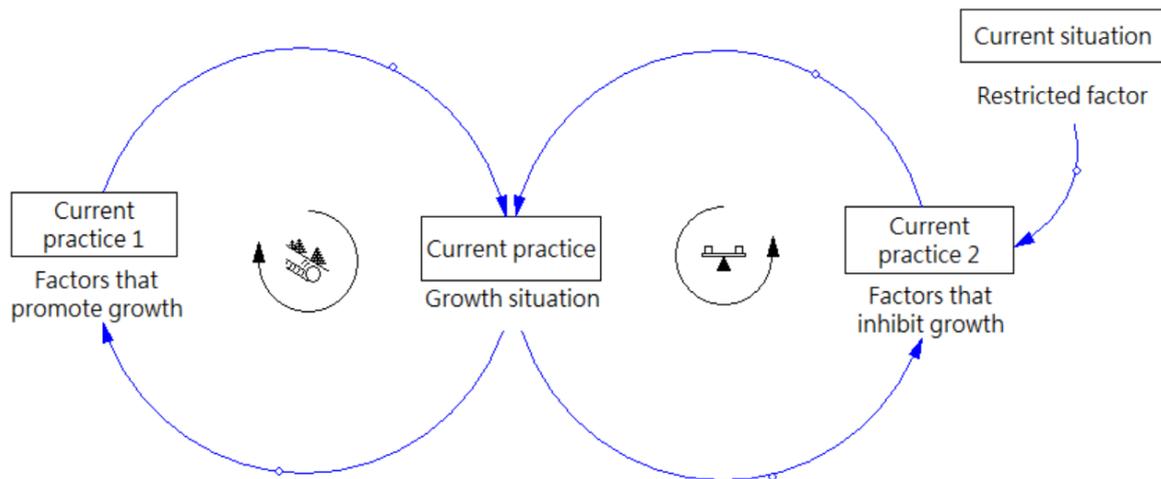
	A single floor	Most of them are located in office buildings, which share entrances and exits with other floors and are prone to infection control problems	Centralized care	Nurse, babysitter
A hospital or clinic is attached	A single floor	Located in a hospital or clinic (in the same building), sharing the entrance and exit with the hospital or clinic	Centralized care	Nurse, babysitter

Industrial business model(China)

model	type	instructions	Care mode	staff
Independent model	Single building	Independent entrance	Centralized care	Nurse, babysitter, maternity matron

			One-on-one care	Nurse, babysitter, maternity matron
	A single floor	Renovation: located in an office or commercial building Hotel (hotel) renovation: lease a hotel (hotel) space, which may be a single floor or multiple floors, and convert one of the rooms into a baby room	Centralized care	Nurse, babysitter, maternity matron
			One-on-one care	Nurse, babysitter, maternity matron
Attached to the hospital	A single floor	A building placed on a certain floor inside or outside a hospital	Centralized care	Nurse, babysitter, maternity matron
			One-on-one care	Nurse, babysitter, maternity matron

Reinforcing Feedback / Balancing Feedback



Peter M Senge(1990).The Fifth Discipline: The Art and Practice of the Learning Organization

Postpartum care institution case

A	B	C	D
T-01	T-02	C-01	C-02
Single building	A single floor	Single building	A single floor
Centralized care	Centralized care	Centralized care	Centralized care & One-on-one care

Established post-natal care institutions with more than three years of experience, and the business model is in line with centralized care and one-on-one care for post-natal care institutions.

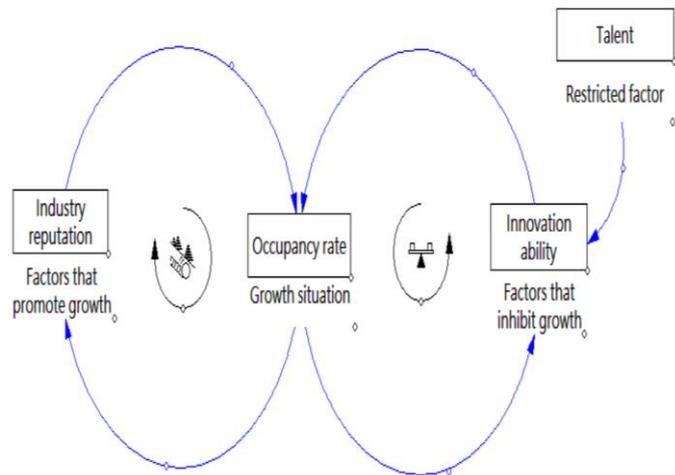
Case analysis

A

T-01

Single building

Centralized care



The Business Model Canvas

T-01

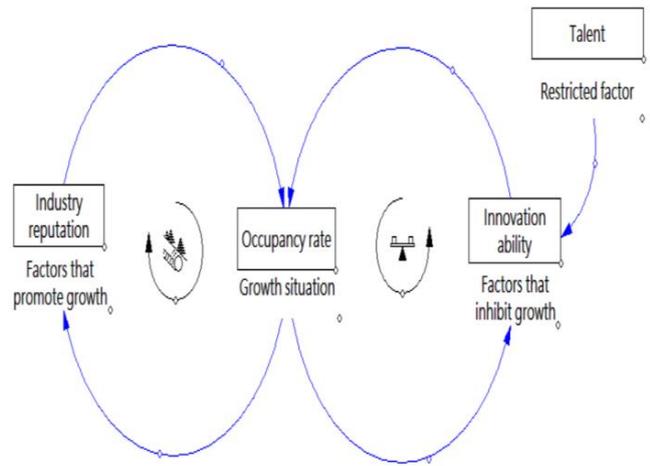
Key Partners <ul style="list-style-type: none"> ✓ Internet platform (facebook) ✓ Baby supplies supplier ✓ Food supplier 	Key Activities <ul style="list-style-type: none"> ✓ Maternity classroom ✓ Women and children exhibition 	Value Propositions <ul style="list-style-type: none"> ✓ Postpartum care ✓ Neonatal Nursing ✓ Moon food conditioning ✓ Infection control 	Customer Relationships <ul style="list-style-type: none"> ✓ Telephone contact during pregnancy ✓ Call back after returning home ✓ Back to her family activities 	Customer Segments <ul style="list-style-type: none"> ✓ The parturient woman within 2 months after giving birth ✓ A newborn within two months of birth
Key Resources <ul style="list-style-type: none"> ✓ Talent ✓ Delivery of monthly meal service ✓ Intellectual property 		Channels <ul style="list-style-type: none"> ✓ The official website ✓ Word of mouth ✓ Cross-industry cooperation ✓ Sales 		
Cost Structure <ul style="list-style-type: none"> ✓ Fixed costs ✓ Variable costs 			Revenue Streams <ul style="list-style-type: none"> ✓ Housing fee ✓ Mother and baby supplies ✓ Monthly meal expenses ✓ Baby sitting fees 	

B

T-02

A single floor

Centralized care



The Business Model Canvas

T-02

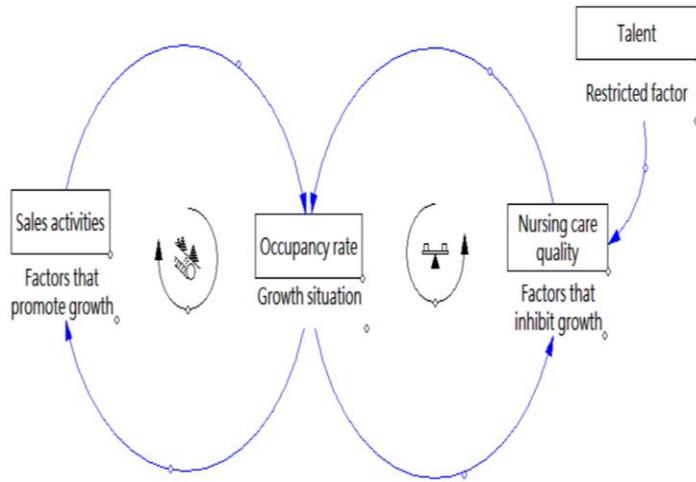
Key Partners <ul style="list-style-type: none"> ✓ Internet platform (facebook) ✓ Baby supplies supplier ✓ Food supplier 	Key Activities <ul style="list-style-type: none"> ✓ Maternity classroom ✓ Women and children exhibition 	Value Propositions <ul style="list-style-type: none"> ✓ Postpartum care ✓ Neonatal Nursing ✓ Moon food conditioning ✓ Infection control 	Customer Relationships <ul style="list-style-type: none"> ✓ Telephone contact during pregnancy ✓ Call back after returning home ✓ Back to her family activities 	Customer Segments <ul style="list-style-type: none"> ✓ The parturient woman within 2 months after giving birth ✓ A newborn within two months of birth
Key Resources <ul style="list-style-type: none"> ✓ Talent ✓ Delivery of monthly meal service ✓ Intellectual property 			Channels <ul style="list-style-type: none"> ✓ The official website ✓ Word of mouth ✓ Cross-industry cooperation ✓ Sales 	
Cost Structure <ul style="list-style-type: none"> ✓ Fixed costs ✓ Variable costs 			Revenue Streams <ul style="list-style-type: none"> ✓ Housing fee ✓ Mother and baby supplies ✓ Monthly meal expenses ✓ Baby sitting fees 	

C

C-01

Single building

Centralized care



The Business Model Canvas

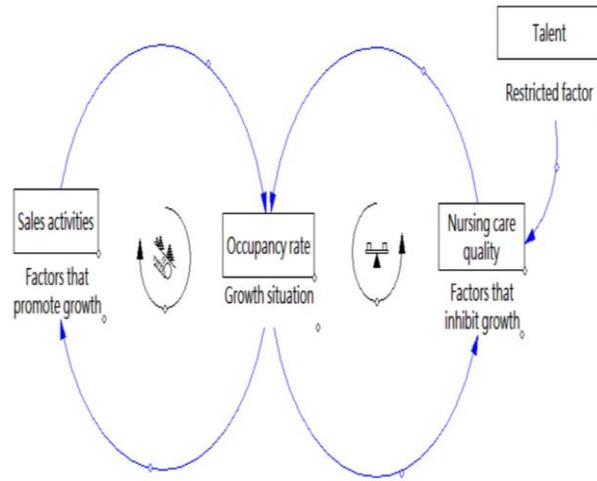
T-03

Key Partners ✓ Internet ✓ Baby supplies supplier ✓ Food supplier	Key Activities ✓ Maternity classroom ✓ Women and children exhibition Key Resources ✓ Talent ✓ Delivery of monthly meal service ✓ Intellectual property	Value Propositions ✓ Postpartum care ✓ Neonatal Nursing ✓ Moon food conditioning ✓ Infection control ✓ Postpartum rehabilitation	Customer Relationships ✓ Telephone contact during pregnancy ✓ Call back after returning home ✓ Back to her family activities Channels ✓ The official website ✓ Word of mouth ✓ Cross-industry cooperation ✓ Sales	Customer Segments ✓ The parturient woman within 2 months after giving birth ✓ A newborn within two months of birth ✓ Women over 2 months postpartum
Cost Structure ✓ Fixed costs ✓ Variable costs		Revenue Streams ✓ Housing fee ✓ Mother and baby supplies ✓ Monthly meal expenses ✓ Postpartum rehabilitation cost		

D

C-02

A single floor
Centralized care
&
One-on-one care

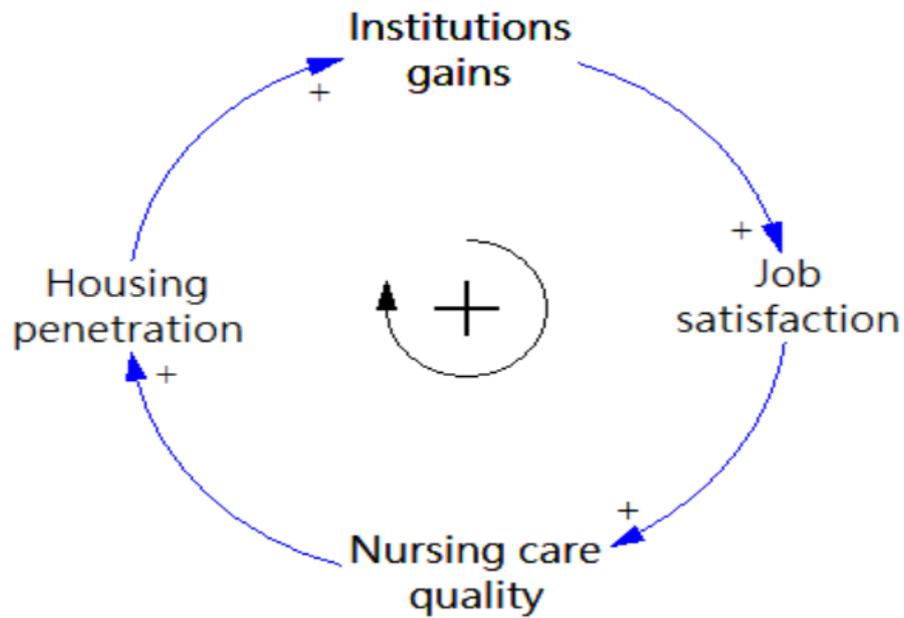


The Business Model Canvas

T-04

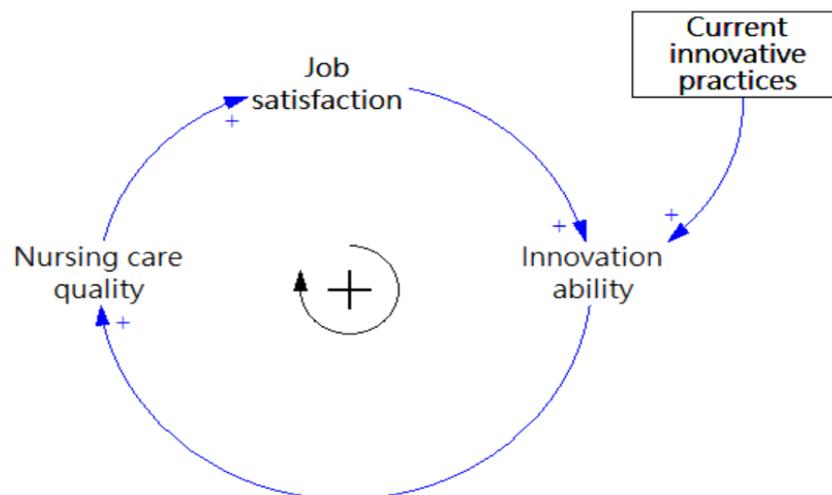
<p>Key Partners </p> <ul style="list-style-type: none"> ✓ Internet ✓ Baby supplies supplier ✓ Food supplier 	<p>Key Activities </p> <ul style="list-style-type: none"> ✓ Maternity classroom ✓ Women and children exhibition <p>Key Resources </p> <ul style="list-style-type: none"> ✓ Talent ✓ Delivery of monthly meal service ✓ Intellectual property 	<p>Value Propositions </p> <ul style="list-style-type: none"> ✓ Postpartum care ✓ Neonatal Nursing ✓ Moon food conditioning ✓ Infection control ✓ Postpartum rehabilitation 	<p>Customer Relationships </p> <ul style="list-style-type: none"> ✓ Telephone contact during pregnancy ✓ Call back after returning home ✓ Back to her family activities <p>Channels </p> <ul style="list-style-type: none"> ✓ The official website ✓ Word of mouth ✓ Cross-industry cooperation ✓ Sales 	<p>Customer Segments </p> <ul style="list-style-type: none"> ✓ The parturient woman within 2 months after giving birth ✓ A newborn within two months of birth ✓ Women over 2 months postpartum
<p>Cost Structure </p> <ul style="list-style-type: none"> ✓ Fixed costs ✓ Variable costs 		<p>Revenue Streams </p> <ul style="list-style-type: none"> ✓ Housing fee ✓ Mother and baby supplies ✓ Monthly meal expenses ✓ Postpartum rehabilitation cost 		

Positive feedback on sustainable development



Housing penetration

After the increase of housing penetration rate, the income of postpartum care institutions will be improved, and the job satisfaction of staff in the institutions will be improved. When the satisfaction of staff increases, the associated work quality (care quality) will increase.

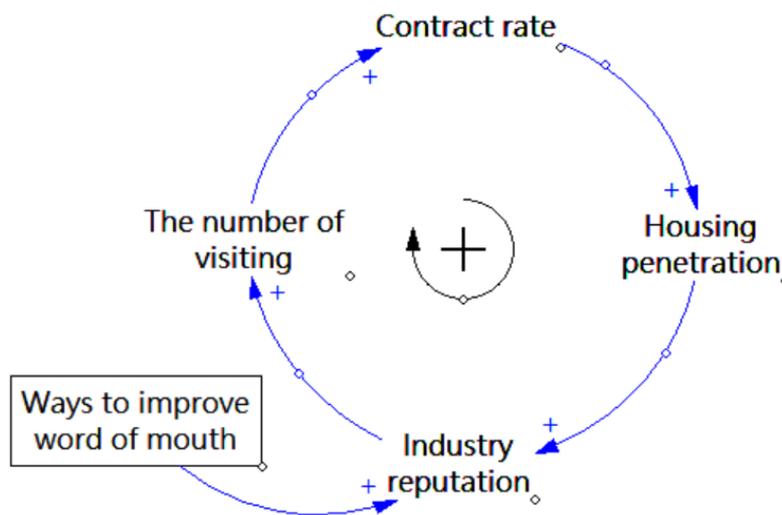


Innovation ability

When employees' job satisfaction increases, their ability and willingness to innovate will increase.

Improve the quality of care in postpartum care institutions.

To explore the innovative practices of postpartum nursing institutions can improve the innovative ability of institutions.



Industry reputation

The improvement of industrial reputation can increase the number of visitors to institutions, and also increase the signing rate relatively, further promoting the housing penetration rate in the industry.

Exploring ways to improve public praise can improve the overall public praise of the industry.

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Organization

Dougherty, D, Taking advantage of emergence for complex innovation eco-systems, *J. Open Innov. Technol. Mark. Complex.* 2017, 3(3), 14.

Cooke, P., A ground-up "Quaternary" innovation strategy for South Korea using entrepreneurial ecosystem, *J. Open Innov. Technol. Mark. Complex.* 2017, 3(3), 10.

Leydesdorff, L., Ivanova, I., "Open innovation" and "triple helix" models of innovation: can synergy in innovation systems be measured? *J. Open Innov. Technol. Mark. Complex.* 2016, 2(3), 11.

How Social Innovation Creates Shared Value for Sustainable Community Development: Taking Kaohsiung Arena as an Example

Min-Ren Yan, Lin-Ya Hong, Hui-Lan Chi, Ray-Yin Kuo

For a long time, most research has been focus on the economic impact of sports stadiums and arenas, the results have shown ambiguous findings and relationship between sports facility construction and economic development (Rosentraub 1994; Baade 1996; Noll and Zimbalist 1997a; Coates and Humphreys 1999, 2003a). Yet little research pays attention on the impact of metropolitan arena, sports facilities and mega-events bring to citizen life and how social innovation corporate creates for community developments. Our research aims to bring a systematic view on measuring the impact of social innovation and shared value creation towards community development by analyzing the operation and management of large scale arena and mega-events, and its relationship and interactions with community citizen and the environment.

Social innovation aims to produce long lasting outcomes that are relevant for society, given the needs and challenges with which society wrestling (Bekkers, V.J.J.M., Tummers, L.G.2009, Voorberg, W.H., 2013). It looks beyond technological innovations and creates public values that are considered important. (Howalt and Schwarz, 2010; p. 18; Hartely, 2005; Moore, 1995). Furthermore, social innovation also refers to the idea of participation of and collaboration with relevant stakeholders that cross organizational boundaries and jurisdictions. (Bason, 2010; Sørensen & Torfing, 2011). This also corresponds with the notion of ‘open innovation’ (Chesbrough, 2003, 2006; Von Hippel, 2005, 2007). A more persuasive, yet incomplete, rationale is that new facilities improve the quality of life in a community. In economic theory, the quality of life effect is captured by three types of benefits. First area is consumer surplus. The second area is externalities. When one consumer benefits from an activity or good that he

or she does not purchase, then he is enhancing his welfare or quality of life in a way that is not recorded in a market transaction. The third area is public goods. A public good has at least one of two characteristics. First, it is non-rival, and non-exclusive. (John Siegfried and Andrew Zimbalist, 2006)

In our case study, Kegel K-arena Sports Co., Ltd. began to operate and manage Kaohsiung Arena in July 1998 and has been operating for more than a decade with strong purpose and commitment to make Kaohsiung Arena as an international event venue and a platform for cultural exchange and educational cultivation for citizen. Kegel K-arena Sports Co., Ltd. with its philosophy of "Global operations and localization management" specializes in organizing and promoting of mega sports, culture and fashion events and exhibitions. We found that hundreds of concerts, activities, and exhibitions not only contributed to the local economic growth and tourism prosperity, the embodiment of corporate social responsibility policy also brings the community with a sense of belonging, a mechanism for relevant stakeholders contributes in their knowledge, information, experiences and resources that co-create added value for public goods and enhance sustainable community development.

Reference

Dougherty, D, Taking advantage of emergence for complex innovation eco-systems, *J. Open Innov. Technol. Mark. Complex.* 2017, 3(3), 14.

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Research on Evolution and Consisting of Platform Business Model based on Structured User Resource

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Abstract

The current platform theory has not yet a clear cognition about platform motivation, platform's construction and evolution mechanism, The platform strategy practice of enterprises is often confused or equated with the strategic concepts of diversification and scope economy, which results in the fact that enterprises could not really get the endogenous network structure effect of the platform that would not help the improvement of the dynamic capabilities of enterprises. Therefore, this paper built a combination study context of platform conversion (Evolution) based on the structured features of user demand (product demand or service demand; target customers or user goals) and enterprise resources foundation (manufacturing resource or service resources) to analyze the contingency characteristics of platform construction objects, platform stability and platform conversion path selection. The research findings as follows: the strategic goal of platform transformation is to search and acquire user resources; to realize the indirect network effect is the basic principle of platform path selection; the "Breakthrough of Unsteady State" aiming to customer goals is helpful to stimulate platform activity. This paper studied the conversion motivation and evolution mechanism of platform business mode firstly based on the perspective of structured user resource, and not only added and enriched the existed theoretical system of platform business model, but also there would be important theoretical reference value for enterprises to build high-level and sustainable network dynamic capability.

Keywords: innovation; platform; policy; business model

Lee, M. H., Yun, J. H. J., Pyka, A., Won, D. K., Kodama, F., Schiuma, G., Park, H. S., Jeon, J., Park, K. B., Jung, K. H., Yan, M. R., Lee, S. Y., and Zhao, X. (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. *Journal of Open Innovation: Technology, Market, and Complexity*, 4(3), 21.

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A study for skin analysis via cloud service to construct innovation models and aboard using system dynamics

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Abstract Purpose/ Research Question:

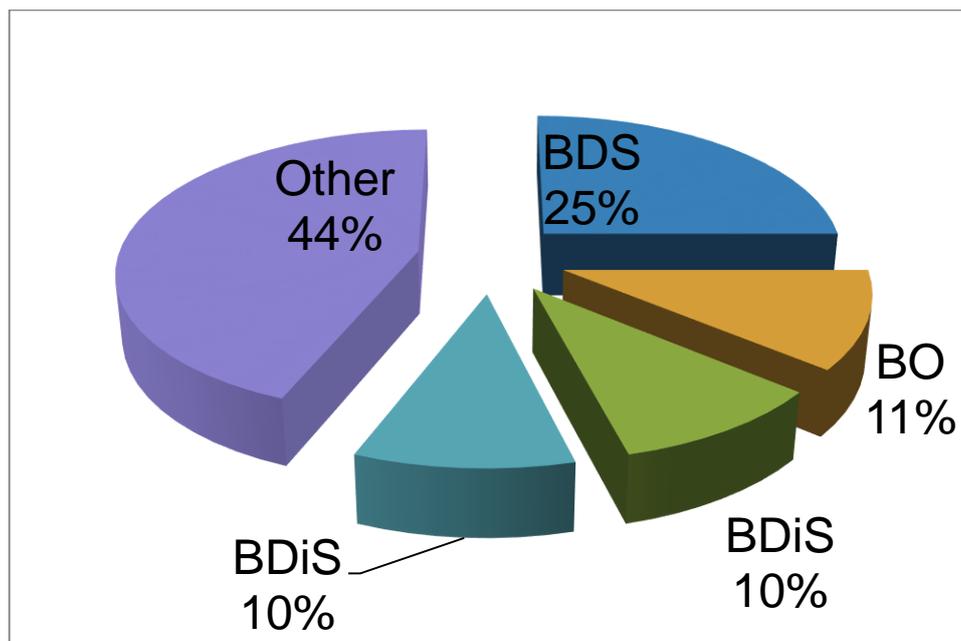
- » Skin analysis is an important service in the beauty sales industry chain.
- » With the advent of the cloud era, Skin analysis activities will also meet the trend of cloud, and technology will automatically manage skin records. This study explores how to quickly spread and popularize the service system in the market in the shortest time by means of dynamic thinking and business simulation software.

Analysis of cosmetics sales market in Taiwan

- > Use the Business Model Canvas to present the operation mode of skin analysis activities of maintenance brand operators
- > How to form a sustainable positive feedback loop is discussed by using the theory of system thinking and the concept of positive feedback loop of system

base mode

Maintenance consumption habits in the Taiwan market



BDS: As a maintenance **Brand** for sales activities in **Department Stores**(Ex.Shiseido、CD...)

BO: As a maintenance **Brand** for **Online** sales activities(Ex.SexLook、UserISM...)

BDiS: As a maintenance product **Brand** for sales activities in **Direct Selling** companies (Ex. Amway, Avon, Nu skin...)

BDrS: As a maintenance product **Brand** for sales activities in **Drug Stores**(Ex. Dr.Wu、KOSE...)

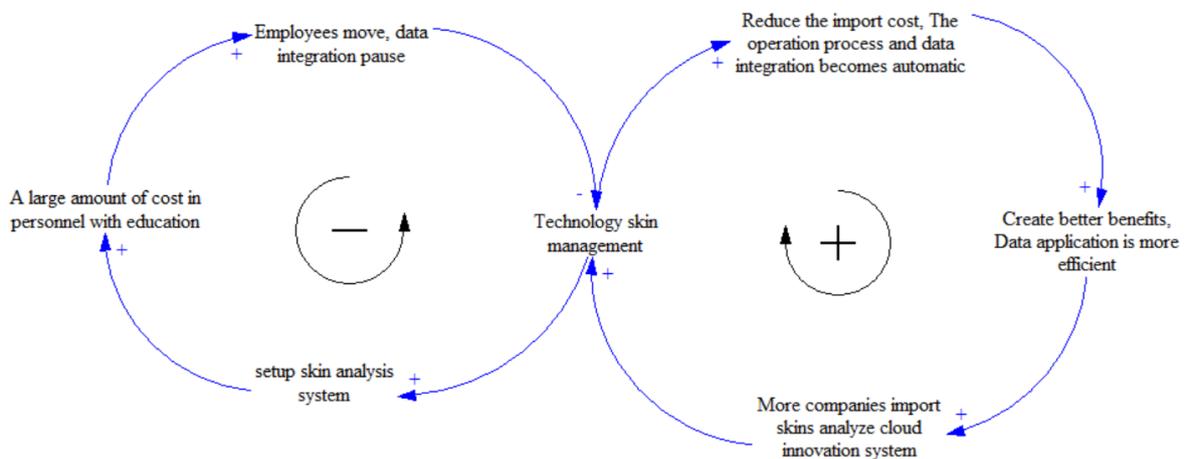
2. Industrial business model

Sales Channel	Selling Situation

BDS (Department Stores)	<p>The popularity of department stores attracts consumers to shopping, some are loyal customers, some are not. When the customer comes to buy, the salesperson can use the skin analysis equipment to do the skin analysis for the customer.</p> <p>Loyal customers can ask customers to come back for skin analysis after they buy for a while and use it. Non-loyal customers cannot retain customer information, so they lose the opportunity to interact with each other</p>
BO (Online sales)	<p>Contact customers come from the Internet, sales activities can not provide skin analysis, almost all rely on online image advertising or Internet Sensation to achieve consumer trust and then purchase activities</p> <p>Each purchase record can be controlled to help establish a good interaction with guests, and it is easier to establish loyal members</p>
BDiS (Direct Selling companies)	<p>Through the direct interaction between many direct sales staff and customers to establish the sales model, because this kind of sales staff has not received professional knowledge, so the skin analysis activities are carried out by trained personnel in the company for customers, customers must go to the company in person to do.</p> <p>Each customer can be controlled because the direct sales person is in close contact with the customer, but only a few customers have skin analysis data</p>
BDrS (Drug Stores)	<p>The brand of this approach generates a good brand image by appealing to the recommendation of doctors, so that customers can trust that they are more advanced maintenance products. Therefore, customers will purchase directly from the drugstore. Sales staff do not maintain the professional knowledge of products, will not carry out skin analysis activities.</p> <p>Because there is no customer information, no interaction with the customer factors, so can not grasp the customer, must always increase the advertising budget to strengthen brand memory.</p>

3. Study design

Reinforcing Feedback / Balancing Feedback

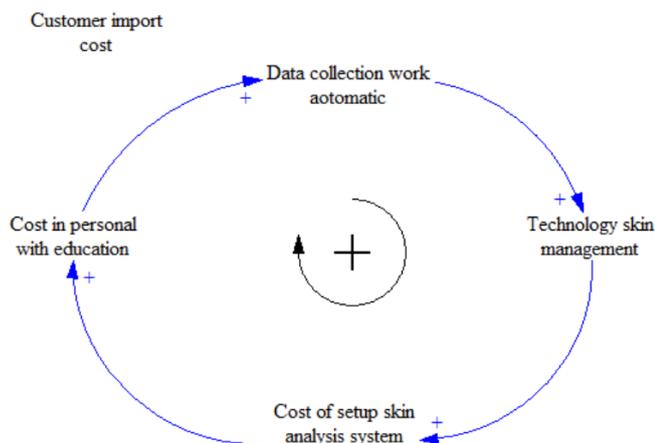


The Business Model Canvas

Key Partners  <ul style="list-style-type: none"> Multinational system service providers with stable performance Business partner member 	Key Activities  <ul style="list-style-type: none"> Network platform Cost reduction Solve problems Supply chain management 	Value Propositions  <ul style="list-style-type: none"> Lower import costs Reduce manpower requirements Free training costs 	Customer Relationships <ul style="list-style-type: none"> Cost reduction Improve customer interaction Easier to master customer loyalty 	Customer Segments  <ul style="list-style-type: none"> Brand maintenance products Maintenance product manufacturing plant* Internet e-commerce Buyers of maintenance products
Cost structure <ul style="list-style-type: none"> Low cost structure Cost comes with use Economies of scale 	<ul style="list-style-type: none"> Can be supplied at low prices 	Revenue  <ul style="list-style-type: none"> System service fee Charge for each service Additional: advertising revenue 		

4. Expected / Results

Positive feedback on sustainable development

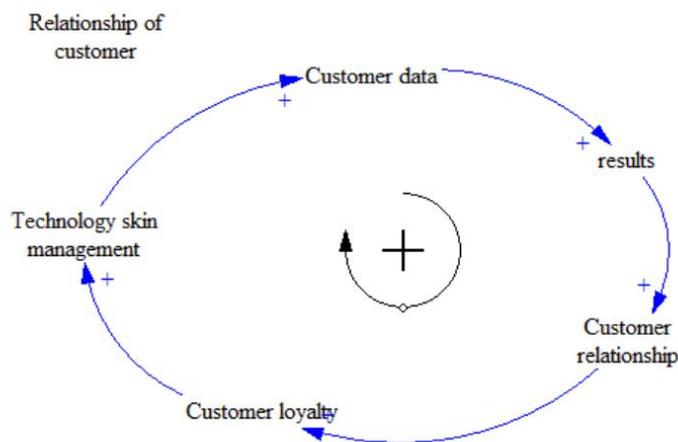


Comprehensively reduce the cost of commercial customers to import the skin analysis system. In the initial stage, there is no cost of purchasing equipment, and only the minimum unit of cloud hard disk space needs to be rented in advance.

The second cost is the system service fee, which is charged only when it is used. However, this direct cost can directly bring orders according to experience, so the system service fee is often positively correlated with

performance.

Positive feedback on sustainable development



In the traditional maintenance product sales model, does the customer continue to use the same brand after buying? It's hard to track down effectively, but this is one of the most valuable parts of the discussion, and we all want to be clear about our loyal customers.

This cloud system can record the track of customers' use at any time, help business members accurately grasp customer loyalty, have more direct contact with customers, and is more helpful to maintain good customer relations.

With this skin management the cloud service system of science and technology, reduce customer import restrictions to spread quickly, improve the penetration rate of target, forming an important node, cosmetics sales industry chain and large data accumulated by science and technology, the big data can be instant feedback to partners, to information sharing, increase the profit of the commercial application.

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**Exploring innovation ecosystem from the perspective of sustainability:
Towards a conceptual framework (extended abstract)**

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Keywords: *Sustainable innovation, innovation ecosystem, sustainability, innovation*

Purpose/ Research Question:

Business success is increasingly dependent upon innovation and sustainability. Innovation is related with knowledge creation and sharing activities within and between organizations. It features explorations and introductions of new products, new methods of production, new markets, new sources of supply, and new industry organizations (Schumpeter, 1934). The Internet of Things, big data, 3-D printing, and other advanced technologies of the Fourth Industrial Revolution, increasingly reflect and enable the development of a sharing economy with features of creativity, participation of small firms, and society involvement (Park, 2017).

At the same time, social and environmental impacts of production and economic activities are becoming increasingly important as companies are now considering sustainable features in their product innovation, process technology and supply chain. Through such approaches as reducing energy consumption, investing on recycling and engaging in community activities, companies' brand and image can better recognized by customers, which in return brings profit to the company in a sustainable way. Sustainability is often addressed through the triple bottom line (TBL) framework, meaning economic (financial), environmental (ecological), and social aspects (Elkington, 1994).

In a proactive way, considerations of these dimensions can be linked to new product and process design, enabling firms to respond to new sustainability pressures and challenges, while also taking advantage of attendant opportunities. Externally, supply management, ethical sourcing, and close customer relationship development can also generate innovation with impacts (and benefits) for both the institution and the wider community. Firms such as Boeing, Airbus, and Apple already conduct practices of innovation through an open system approach which combines knowledge resources of upstream and downstream organizations in their supply chain (Zeng, et al., 2017). Beyond their supply chain partners, government, industrial association, universities and wider society can also be actively engaged, altogether forming an innovation ecosystem, with the features of multi-level, multi-modal, multi-nodal, multi-lateral systems, and with features of co-existence, co-evolution, co-specialization, and co-opetition (Carayannis and Campbell, 2006). It is believed that innovation has expanded from Mode 1 university-based knowledge linear model, to Mode 2 (Gibbons et al., 1994) university – Industry non-linear model, and now to Mode 3 (Carayannis and Campbell, 2006) known as the university – industry – government – civil society non-linear model “quadruple helix model” (Carayannis and Campbell, 2006). With civil society involved, the concept of sustainable innovation starts to emerge in this complex dynamic ecosystem.

Research on sustainable innovation been conducted recently, however, its business model as yet remains underexplored (Boon, and Ludeke-Freund, 2013). Furthermore, the concept of sustainable

innovation expands from corporate social responsibility to consider the dynamic network, which is central in the context of a new industry era of innovation, sharing economy, collective learning, and society involvement. Therefore it is important to understand its new meaning, and identify research areas that will shape a meaningful research agenda.

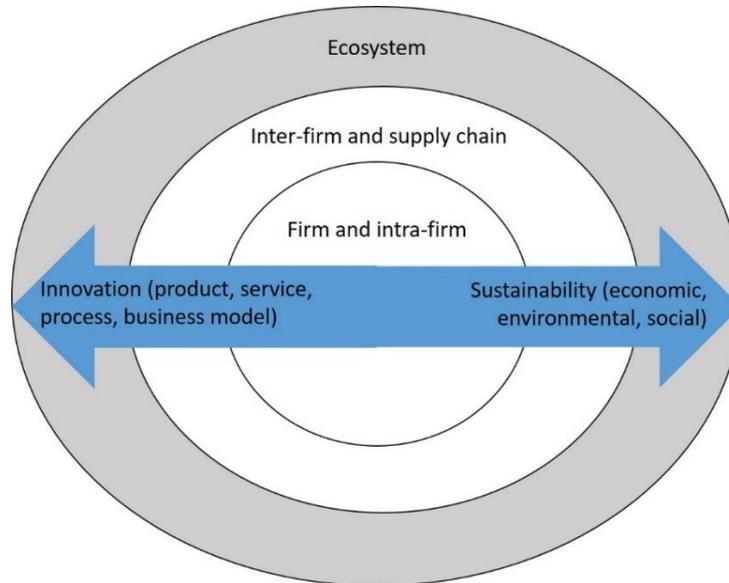


Figure 1. Research scope

Figure 1 demonstrates our research scope, which starts with firm level sustainable innovation as the knowledge building blocks, towards inter-firm theories of sustainable innovation, and eventually reaching the emerging issues at the innovation ecosystem level. Driven by academic interest and industry requirement, our paper aims to explore the issue of innovation in terms of sustainability. Specifically, the following three questions will be answered.

- What are the key areas of sustainable innovation at the intra and inter-firm levels?
- What are the emerging issues of sustainable innovation in the context of innovation ecosystem, from theory and practice?
- What are the future research areas of innovation, from the perspective of sustainability?

Key Literature Reviews:

Extant literature can be reviewed from perspectives of innovation and sustainability, namely firm and intra-firm level, inter-firm and supply chain level, and ecosystem level.

Firm and intra-firm level:

Inside companies, innovation is related to product and service design, as one important decision-making area of operations. The process involves transforming resources, such as design and technical staff, equipment, and transformed resources such as information, in order to deliver new products and/or services with clear specification. Sustainability is closely connected with product and service innovation, including recyclability of materials, energy consumption, waste material generation, and process technology in terms of waste and product disposal, noise pollution, fume and emission pollution and energy efficiency (Slack, et al., 2013). Environmental technologies including pollution prevention and control, and environmental management systems are considered as hard and soft technology management (Klassen and Whybark, 1999). At the firm and intra-firm level, sustainable innovation interact with products, processes, services and business models (Schiederig et al., 2012).

Inter-firm and supply chain level

The link between sustainable innovation and supply chain management has been emphasised on the basis that a requirement to be able to assess and improve the sustainability impacts of a product across its lifecycle inevitably requires input and contribution from the product's full supply chain, which likely exists outside of the full control of the focal company (Carvalho and Barbieri, 2012). Isaksson et al. (2010) emphasised that a greater orientation towards a supply chain/management perspective can lead to greater potential for innovation in the name of sustainable development, which may be seen to be reinforced by a perspective of supply chain as a 'knowledge alliance' (Zhang et al., 2018), on the assumption that knowledge increase is an enabler of innovations for the benefit of sustainable development.

This builds on previous acknowledgement of the role of supply chain management in the success of traditional (i.e. non-sustainable) new product development efforts (van Hoek and Chapman, 2006). Carvalho and Barbieri (2012, p.147) therefore defined sustainable innovation as "the introduction of products, production processes, management or business methods, new or significantly improved, that bring economic social or environmental outcomes, considering the supply chain and compared with relevant alternatives". In more recent years, efforts have emerged to more systematically and formally codify the concept of sustainable supply chain innovation (SSCI) (Tebaldi et al., 2018; Gao et al., 2017). Gao et al. (2017) suggest that 'sustainable supply chain innovation' has emerged from the root of supply chain innovation (SCI), which can be defined as an integrated change from incremental to radical changes in the product, process, marketing, technology, resource and/or organisation which are associated with all the related parties, covering all related functions in supply chain and creating value for all stakeholders" (Tebaldi et al., 2018, p.3497).

Therefore, in the context of supply chain management, sustainable innovation may be seen as complex and multi-faceted, reflecting numerous categories or 'types' of innovation (product, process, organisational structure and business models) (Tebaldi et al., 2018) which are variously intersected with the multiple inter-firm, upstream and downstream processes that constitute supply chain management (including for example, 'make', 'source', 'deliver', 'retail') (Supply Chain Council, 2010; Leon-Bravo et al., 2018). Gao et al. (2017) codifies the breadth of these intersections in his conceptual framework of SSCI. This is then further detailed by the multi-dimensional performance indicators of sustainability that expand beyond traditional economic performance indicators of innovations (such as costs, return on investment or market share) to include social and environmental performance indicators (such as waste reduction, recyclability, health and safety etc). In the context of food supply chains, 4 sustainability criteria have been codified to classify sustainable new food product development: developing a healthier product (e.g. reducing preservatives); designing for the environment (i.e. selecting materials/components that have minimum impact over entire life); design for extending lifecycle (e.g. through use of specific long-lasting materials) and design with sustainable materials (e.g. adopting recycled materials) (Leon-Bravo et al., 2018).

The implementation of innovative strategies for enhancing sustainability across supply chains is driven by both internal and external motivations and incentives (such as government regulations, customer requirements, competitive advantage and the personal values of managing directors and/or employees) (Seuring and Muller, 2008; Walker and Jones, 2012; Cagliano et al., 2018). These strategies may be seen as 'reactive' or 'proactive' (Seuring and Muller, 2008) and thus as 'incremental' or 'radical' in their innovativeness, respectively (van Bommel, 2011; de Carvalho and Barbieri, 2012): incrementally innovative strategies for enhancing sustainability in the supply chain may involve supplier management and development approaches which seek to improve the sustainability (environmental/social) performance of existing supply chain structures/products/processes through managing risks and performance levels across the supply chain; radically innovative strategies might involve the proactive development of new sustainable products which requires the development of

new relationships and new supply chain structures (Seuring and Muller, 2008; van Bommel, 2011). In this regard, for both incremental and radical innovations for sustainable supply chain management, the importance of relationships and collaboration with supply chain partners has been emphasised (Neutzling et al., 2018).

The ability to manage relationships and develop partnerships for sustainable innovations in supply chains has been identified as one of a series of 'dynamic capabilities' that are seen as an essential prerequisite for innovating for sustainability in supply chain management (Beske et al., 2014). Through a case study of an Italian SME in the food industry, Leon-Bravo et al. (2018) therefore linked certain dynamic capabilities to certain types of innovation (incremental or radical). The authors found that while DCs such as *knowledge assessment* (the ability to assess knowledge for its quality) and *reflexive control* (the ability to constantly monitor the performance of the supply chain in terms of its required functionality) were necessary for incremental innovation, *partner development* (developing supply chain partners' capabilities through knowledge sharing, joint programs), *supply chain reconceptualization* (the ability to re-design supply chain architecture as required), *co-evolving* (developing and implementing new capabilities through collaboration), and *knowledge acquisition* (the ability to acquire knowledge already possessed by other supply chain partners) were necessary for radical innovation.

In this regard, the literature has highlighted the role of the focal company (the company that rules or governs the supply chain, or has direct contact with the customer, or is the brand-owner [Seuring and Muller, 2008]) as a source of diffusion of innovation across their supply chain: Carvalho and Barbieri (2012) described the focal company as an 'innovation inductor'. Their work builds on Van Bommel (2011) who suggested that the 'innovation power' of a focal company mediates the relationship between external drivers of sustainability and the implementation of sustainable supply chain strategies (Seuring and Muller, 2008). The 'innovation power' of the focal company is composed from the 'innovation characteristics' of the focal firm (such as cooperation between departments, learning and adapting, possibility for experimenting, and results driven) and the 'cooperative characteristics' of the supply chain (such as level of trust, reputation, joint programs and cooperative information sharing systems).

Ecosystem level: open innovation, innovation ecosystem, triple/quadruple helix

At the ecosystem level, the concept of open innovation emerges as firms use external and internal ideas to advance their technology, breaking down company boundaries (Chesbrough, 2003) towards knowledge sharing for product and service development. While supply chain theories focus on industry and value chain level, the concept of business ecosystem refers to the evolution of suppliers, lead producers, competitors, and other stakeholders, going through existing collaboration, through expansion, convergence and renewal stages (Moore, 1996). From a knowledge management perspective, innovation ecosystem consists of economic and non-economic agents and relations including technology, institutions, sociological interactions, and culture (Adner and Kappor, 2010; Mercan and Goktas, 2011). Recent theories of triple helix investigate the non-linear connection among university, industry and government for knowledge creation and sharing, where industry acts as the source of production, government provides regulations, stability and rules of play, and universities are the suppliers of new knowledge and technology (Etzkowitz and Leydesdorff, 1995; Etzkowitz, 2003). Based on triple helix, a further element of innovation - media-based & culture-based public/civil society/intermediary organizations is later on identified, altogether known as the quadruple helix model (Carayannis & Campbell, 2009). With the introduction of civil society and media/culture based intermediary, sustainable innovation involving society becomes a new research topic in the quadruple helix and ecosystem environment. However, currently there is limited understanding of soft side issues of quadruple helix ecosystem, such as trust and relationship building (Mill et al., 2018).

Apart from the helixes, industrial association plays an important role in the ecosystem, helping firms to develop capability (Schwartz and Bar-El, 2015). Social innovation studies provide another stream of literature, emphasizing the role of product and process innovation with social purpose (Mair and Marti, 2006), and developing social entrepreneurship (Kanter, 1999). Apart from universities and customers' involvement, firms can work with NGOs and intermediaries to strengthen open innovation performance (Rauter et al., 2018). At the regional level, studies explore the relationship between environmental sustainability and smart cities, combining digital technology innovation, knowledge management, economic efficiency, creativity, sustainability, and long-term urban planning (Trindade et al., 2017; Chang et al., 2018). A new economic culture emphasizing knowledge and learning shall be involved with the emergence of knowledge and smart cities (Carrillo, 2015). Carayannis and Campbell (2010) suggested that eco-innovation and eco-entrepreneurship should be highlighted in a broader understanding of innovation, with industry, firms, economic system; state, government, political system; academia, universities, higher education system; media-based and culture-based public; and natural environmental and natural environments of society contexts, proposed as the new framework of quintuple helix.

Design/ Methodology/ Approach:

The aim of this paper is to investigate the emerging phenomenon of sustainable innovation, in the context of innovation ecosystem and quadruple helix environment. A systematic literature review is beyond our research scope. Instead, we take deep analysis into the key theoretical work related to innovation and sustainability, and focus on recently published literature review papers which cover sustainable innovation, defined as “transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the acceptability, sustainability and societal desirability of the innovation process and its marketable products” (Von Schomberg, 2011). Based on this, we explore broader meanings and emerging issues which can link innovation and sustainability. Thus, we summarize key issues from firm (intra-firm) level, supply chain (inter-firm) level and ecosystem level, which provides the key building blocks of our conceptual framework.

Current literature clearly shows the interaction of innovation and sustainability at the firm and supply chain level through product and process innovation. However, sustainable innovation on the ecosystem level, combining the feature of openness, co-evolution among university, industry, government and civil society is not clear yet. In fact, empirical studies on quadruple helix innovation just begins to emerge (Mill et al., 2018). As a new concept, the implementation of responsible innovation in the business context is still limited (Lubberink et al., 2017).

Thus, to enrich our framework, we further conduct exploratory case studies. As Eisenhardt (1989) stated, case studies can explain details of current phenomenon. Yin (2003) suggested that case study method be applied to explain, describe, illustrate, explore and for meta-evaluation. We select 2-3 firms, demonstrating good practice of achieving sustainable innovation through product development, stakeholder engagement, open platform, social innovation or external collaboration at the ecosystem level (Table 1). We collect secondary data by exploring companies' online information, sustainability reports, and case materials from the Case Centre (<https://www.thecasecentre.org>).

Table 1. Exploratory case companies

Company (tbc)	Research focus	Source of data
HEINEKEN (tbc)	Supply chain level Open innovation	The Case Centre Company website/online report

BMW (tbc)	Sustainable supply chain, Product sustainability Open innovation	The Case Centre Company website/online report
Unilever (tbc)	tbc	tbc

Our data analysis also follows the levels of firm (intra-firm), inter-firm (supply chain), and ecosystem, against the triple-bottom-line of economic, environmental and social sustainability. Combining literature and industry review, we then propose a conceptual framework to combine innovation and sustainability with key players (enablers) and KPIs at the ecosystem level. We also propose a research agenda, and seek to achieve further validation the framework through in-depth primary case studies. Figure 2 shows our research design and approach.

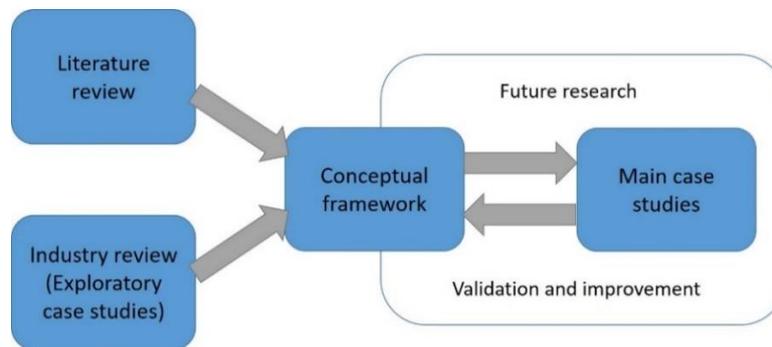


Figure 2. Research process

(Expected) Findings/Results:

Our literature review suggests that at the firm and inter-firm levels, product, service and process sustainable innovation studies are already mature, as part of operations and supply chain management theories. At the ecosystem level, open innovation highlights knowledge creation across companies with a clear objective, such as a product design, whereas business ecosystem and innovation ecosystem involves uncertainty of the innovation output, while the system itself is an extension and improvement of existing collaboration. Triple helix and quadruple helix theories provide models of non-linear innovation, with university, industry, government and society interaction. In particular, with society and environment highlighted in the recent quintuple helix theory, innovation is closely linked to sustainability. However, as new theories, details are not clear, which need more empirical studies. Thus, to further understand detailed meaning and new issues of sustainable innovation, we investigate into two companies, which have launched sustainable innovation related programs either at the network or society level.

Case one – HEINEKE (tbc)

At the firm/intra-firm level, HEINEKE considers using renewable energy (solar and wind energy), innovation into natural material and product, reducing waste and improving quality through improving operations technology (e.g. Storing). To promote shareholder interaction, it launches the project of “Innovators Brewhouse”, as connected innovation space, open to entrepreneurs, inventors, universities, suppliers and individuals. The aim is to collectively find solutions to Heineken challenges through invention and shared development. These challenges include sustainability (such as packaging technology), brewing and distribution, technology, product and ingredients.

Case Two – BMW (tbc)

In terms of product design, electric mobility is currently BMW’s main strategic focus. For example, the company develops battery technology in Germany, the US and China, forming local supply chains. BMW conducts research on innovative tank and refueling technologies combined with a new fuel cell cooling concept. In addition, open innovation offers the company opportunities to increase its product pipeline and to integrate external ideas. One of its approaches is the Co-Creation Lab, an open platform where the public can share ideas and opinions about the future of cars and co-create products and services. The lab hosts innovation competitions such as the BMW Group Interior Design Contest that challenged the crowd to come up with innovative ideas to personalize the interior of cars.

While literature highlight social innovation, user safety, eco-efficiency, and government policy, industry practice suggest open platform, shareholder engagement, cultural, trust relationship and public/social innovation. Combining literature and industry observation, we summarize sustainable innovation related activities at firm, supply chain, and ecosystem levels, along with the triple-bottom-line framework of sustainability (Table 2).

	Firm level innovation	Supply chain and inter-firm level innovation	Ecosystem level innovation
Economic sustainability	<ul style="list-style-type: none"> - Social innovation and CSR - Business model innovation - New product development and innovation (achieving ecological features and cutting down cost) 	<ul style="list-style-type: none"> - Adopting sustainable production along the supply chain - Sustainable and ethical sourcing - Technology transfer from university to industry - Developing trust relationship with supply chain partners - New process innovation - Learning and sharing knowledge 	<ul style="list-style-type: none"> - Focal firms providing open platform - SMEs involvement and expansion - Government providing infrastructure support and long-term urban planning - Government providing guidance for public-funding - Social enterprise development - Industrial association helping to develop capability
Environmental sustainability	<ul style="list-style-type: none"> - Improving ecological feature of product and service - Adopting sustainable production at firm level (e.g. recycling, reducing waste and packaging, new energy) 	<ul style="list-style-type: none"> - Adopting sustainable production along the supply chain - Sustainable and ethical sourcing 	<ul style="list-style-type: none"> - Co-develop solutions related to environmental issues (e.g. though open platform)

Social sustainability	<ul style="list-style-type: none"> - User safety - Community engagement 	<ul style="list-style-type: none"> - Ethical sourcing - User and community engagement - Fair trade supply chain 	<ul style="list-style-type: none"> - Shareholder involvement (including NGOs and intermediaries) - Social enterprise development - Promoting a culture of innovation (e.g. with media) - Users contribute as source of innovation/open innovation - Public innovation contest
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Table 2: A summary of sustainability innovation related activities on network framework of sustainable innovation

So far theory and practice explored demonstrate clear links between innovation and sustainability at the firm and supply chain levels. However, at the innovation ecosystem level, there are research gaps. Details of how sustainable innovation can be formed, developed and improved are as yet unknown. Exploratory case studies shows firms improving ecological feature of product and service, reducing carbon footprint though improving internal operations, and collaborating with supply chain partners. This can be the practical meaning of sustainable innovation at the firm and supply chain level. At the ecosystem level, the concept of sustainable innovation means much more. Industry practice suggests co-creating knowledge, stakeholder engagement, working together with partners and customers for solutions related to technology, product development and environmental sustainability. In this way, sustainability can be a driving force of innovation and business changes, whereas the approaches of innovation contributes to sustainability, providing new agenda of economic, social and environmental issues. As illustrated in Figure 3, the two dimensions interact together, forming a feedback loop in a dynamic way. During the interaction, the key players and enablers include industry (companies, suppliers, competitors etc.), university, R&D institutes, government, users and NGOs. The outcome is sustainable innovation ecosystem in terms of long-term product, service, process, business model, and network development.

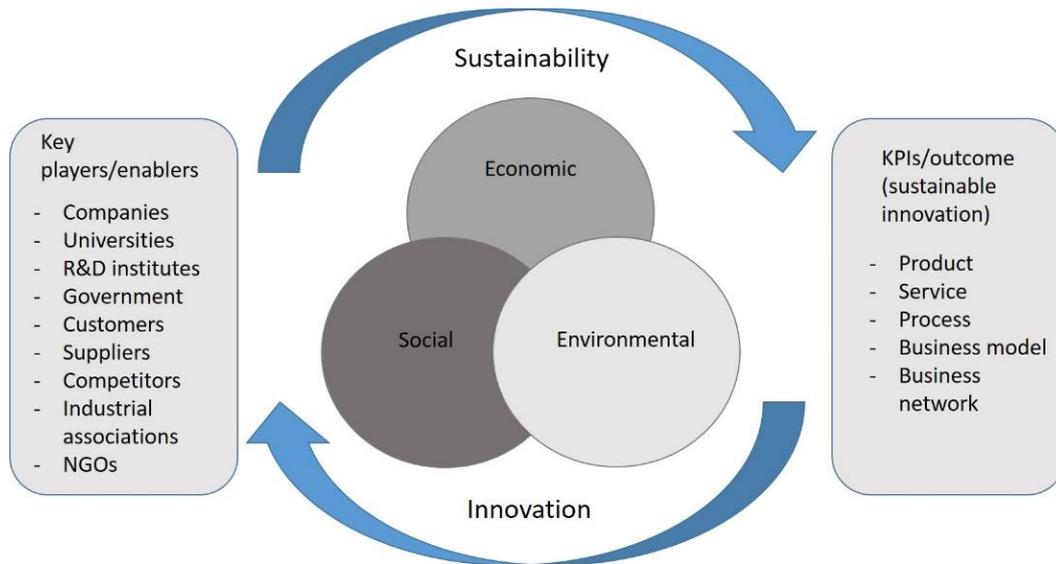


Figure 3: A conceptual framework of sustainable innovation

From our concept framework, there are also other emerging issues, which are tentatively proposed as important future research areas:

- Open innovation is regarded as an effective way to achieve sustainable innovation through collaboration and stakeholder involvement. It is built upon a well-defined industry sector or product. From industry observation, open platform can be initiated by large firms which already have resource such as recognized brand and market. However the role of SMEs are unclear, especially in the early stage of innovation ecosystem. So far innovation research on SMEs still has been paid little attention, particularly in less developed countries (Siyanbola et al., 2016). Can SMEs play more active role in the ecosystem? How can SMEs learn and share knowledge, expanding and achieving sustainable development? Can SMEs form a business ecosystem, without leading large firms? These can potentially be new topics of sustainable innovation in terms of social and economic sustainability.
- The same situation perhaps applies to less developed countries and regions where there is no leading firms, or knowledge resources such as universities. In this case, can society or government contribute to the forming of an innovation ecosystem? The study into policy management can enrich the triple and quadruple helix, and even the latest quintuple helix theory.
- In the context of innovation ecosystem, theory suggests that government, industry, university, and civil society can interact to create knowledge; however, empirical studies are needed to explore the details. In particular, research should focus on the structure, component, dynamic process, and key performance indicator of sustainable innovation. Other issues such as the impact of culture on sustainable innovation, the soft side of management such as trust relationship can also be potential research areas.

Research limitations/ Implications:

With the aim of understanding innovation from a sustainability perspective, this paper contributes to the theory of innovation and sustainability in the context of ecosystem and quadruple helix. Through a review of existing literature and industry case studies, we identify key decision-making areas that exist at the firm, inter-firm and ecosystem levels (Table 2). We also develop a conceptual framework (Figure 3) suggesting the interaction between innovation and sustainability as dynamic process involving key players to deliver the outcomes. Based on the framework, we further propose research areas.

Apart from enriching innovation theory, our findings also advance the concept of triple bottom line by linking it with emerging issues of innovation, with a broad range of stakeholder involvement.

There are some limitations of our study. Firstly, we provide an initial theory investigation, not a systematic literature review of innovation and sustainability. Secondly, though we conduct industry review, secondary case studies constructed from online resources can only help to develop an initial conceptual framework, not an in-depth empirical reality of business practice. Similarly, our insight is based on two exploratory company cases, which cannot represent the diversity of industry sectors in the complex innovation ecosystem. Therefore, we believe that future research should investigate on a broad range of industry sectors, taking different players such as government, university, civil society into account. We also suggest using in-depth primary case study method to further improve and validate the framework.

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The change of China government's role in the development of government WeChat:Case of NanJing city

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Abstract

Purpose-Since Klaus Schwab and the World Economic Forum declared the arrival of the Fourth Industrial Revolution, there has been much discussion about it. However, there is no commonly agreed-upon definition of the Fourth Industrial Revolution.^[1]As the development of high technology, information and communications technology (ICT) and e-government has pursued improving efficiency, productivity, democracy, responsiveness and transparency in government, the demand for efficient government administration systems and government transparency has increased.Government actors have an important role to play in creating healthy public policies and supportive environments to facilitate access to safe, affordable, nutritious food.The purpose of this paper is taking Nanjing as an example to discuss,theoretically and practically,the change of China government's role in the development of government WeChat.

Design/methodology/approach-With the advent of government WeChat, the role of government has been transformed into a platform builder.This paper discusses the change of China government's role in the development of government WeChat by addressing the following research questions:Why has the government role changed? What changes have occurred in the government's role? Is the change in government role beneficial to this society?In addressing several questions the author draw on examples of government WeChat in NanJing city,and comprehensively use the literature research method, case analysis method, comparative research,etc..

Findings-Theoretically,the study found that government functions close to life and emotions and government functions that are close to people, services, and transparency are more likely to be favored by the public, but people's livelihood services and excessive softening of content are in the process of "boundary adjustment" , and no balance is found; Coexist with the mission model, forming a role conflict; influence is determined by the administrative level and local economy.Practically,in the context of "Internet +", the information-welfare project organized and implemented by the National Development and Reform Commission and other departments has achieved considerable results. This paper explores the transformation of the role of the Nanjing government in the development of government WeChat, with a view to triggering practice of In-depth exploration and practical innovation of "Internet + government service".

Implications-The operation and promotion of the government WeChat is to explore the epitome of the transformation of government functions. The dual task of modernization and the transformation and transformation of the economy and society objectively require the government to shift from construction to service-oriented government, sunshine government and rule of law government. The goals and tasks of transformation objectively require the government and the people to reduce the power distance and flatten the information communication. An official media channel directly exposing government affairs information, policy interpretation, political and civil interaction, and comprehensive services to the public has become the trend of the times. The government WeChat is just able to respond to the internal requirements of the government in the new media era for social governance and functional transformation, and become a new platform and new channel for the government to provide public services. Government WeChat has an important influence in government information disclosure, network public opinion guidance, digital governance, and image publicity. Therefore, the construction of new government media is an

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important measure for the transformation of the government governance model, especially for the service-oriented government.

Contribution-As the 4th industrial revolution proceeds, the paradigm of innovation is changing from closed innovation to open innovation. ^[2]Sustainable Environment based global goals should be added to sustainable economy. For this, we propose dynamic balance between three sub-economies such as open innovation, closed innovation, and social innovation sub-economy.^[3]Strategic emerging industries (SEIs) represent the future direction of industrial developments and are crucial in stimulating the overall and long-term development for economy and society. The government plays a key role in promoting the development of SEIs. This paper aims to examine the transformation of the role of government in the development of government WeChat and its role. Based on the current experience of government WeChat adopted by Nanjing, with the aim of optimizing "Internet + government service", it proposes corresponding countermeasures for the optimization of communication content, strategy and role orientation of government WeChat.

Keywords Government WeChat, Government role, Nanjing.

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Development of education model for improving collaboration creativity

Based on the online learning system (Moodle)

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Abstract

Purpose/ Research Question:

In recent years, Korea has been spreading various online education methods that utilize IT technology along with its development. However, in most cases of online learning, the study of system design and effectiveness related to learners' self-directed learning skills is largely done, and the study of methods of teaching to enhance collaborative creativity is insufficient. In particular, research on the effectiveness and development of a Moodle-based education model, one of the online free learning systems, is incomplete. Accordingly, research on the Moodle-based online education model is needed to enhance the creativity of collaboration in the learners online learning environment [1].

Moodle's Online Learning Management System, an open source for eLearning, is the world's most popular learning management system except Blackboard. The Moodle Online Learning Management System is implemented simultaneously in PC and smartphone environments. Moreover, through collaborative learning, it can be expected to enhance collaborative creativity beyond the effectiveness of learning itself.

In response to these expectations, this study aims to develop a Moodle-based educational model to enhance learners' learning convenience and accessibility and to enhance their collaborative

creativity. Specific research issues to achieve these objectives are as follows:

First, what are the components of the online learning system for promoting collaborative creativity?

Second, what about the online learning system education model for promoting collaborative creativity?

Key Literature Reviews:

The development of IT technology and the transition to knowledge and information society in the 21st century brought about many changes in the education. Especially, in the field of education, e-learning education has been expanded and interest in education methods for cultivating higher spirit including learner's creativity, problem solving ability, and cooperative ability has been increased through various interactions between instructors and learners. In particular, as the educational paradigm shifts to the E-learning environment, learners are recognized as members of the learning community who pursue common values and goals, and are differentiated from the teaching-oriented traditional education. It also emphasizes that knowledge and experience that is limited to a few in the past should not be given to only a few, but should be shared anytime, anywhere [2], [3].

Overseas universities are also developing smart learning environments through standardized platforms and Web 2.0 learning tools through student-led collaboration. These changes have increased interest in the development and use of open source content for education. In particular, Moodle, which is represented by open source, is now used by more than 40 million people in 213 countries and more than 70 universities. In addition, the product line occupying the LMS market consists largely of Blackboard, Sakai, Desire2Learn, and eCollege. Among these are Moodles, Sakai, DotLRN, ILIAS, ATutor, Cholla and OLAT, which are considered relatively good open source LMS, excluding commercial LMS [4].

Modular Object-Oriented Dynamic Learning Environment (Moodle), an open-source LMS developed in Australia in 2002, was released as of March 2011 with the 1.0 version. In a collaborative learning environment that utilizes Moodle, one can become a professor or learner. Learners can edit

content through collaborative activities in a forum or in a Moodle learning activity such as wiki, lexicon, database, or message. These learners' collaborative learning activities also help other learners with their learning experiences.

Therefore, in this study, we intend to develop an online free learning system-based education model for developing collaborative creativity. In particular, we will analyze the collaborative learning function of the Moodle online learning system. Next, we try to develop a cooperative learning model based on the relationship between cooperative learning function and creativity factors.

Methodology:

The purpose of this study is to develop an educational model based on Moodle 's online learning system to promote cooperative creativity. Research method First, we analyze the function of cooperative learning of Moodle online learning system. In addition, literature research is conducted to derive the relationship between cooperative learning functions and creativity factors. Second, Moodle online learning system analysis, system configuration, development environment, and initial screen are constructed to develop the education model.

Results:

Cooperative Learning function and creativity linkage of moodle online learning system

The Moodle has a function that allows the class members to gather and facilitate free discussion and evaluation. In particular, Moodle has a number of features that help cooperative learning. Because of these advantages, it has the largest number of institutions and users in the world, based on the open source learning management system area. In addition, flexibility of co-learning functionality allows one to freely modify one's opinion. It is very important in the recent e-Learning trend that enables collaborative learning beyond the traditional e-Learning form where simple questions or tasks were presented. That is, the system flexibility of various learning processes, such as collecting individual opinions, writing documents, and meetings, is becoming a very important element in e-Learning learning models.

In terms of education theory regarding the Moodle, it is designed to promote cooperative learning with constructivism. These examples are well presented in the Moodle's menus. Also, the functions make the learners answer, evaluate and recommend themselves. The interactive assessment menu allows students to evaluate tasks each other or participation in learning activities, so these functions can be used to promote collaborative creativity.

In addition, the Moodle System blogs and wiki allowed learners to easily create web content and create a natural cyber community. If blogs and wiki are used in the education, they can be self-controlled and proactive. You can create a global cyber community by posting articles and links of individual interests on the blogs and sharing them with others, and use the Forum menu to learn actively.

Moodle online learning system development system analysis and design

System Configuration

Development Environment

Initialization plane

Detailed screen (based on collaborative creativity)

Research limitations:

The online learning system developed in this study has a limitation in program modification because it implemented by customizing the package. The online learning system developed in the research is an open source system, so it may be limited to use some functions.

Keywords: collaboration creativity, online learning system, Moodle

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The Study on the Esthetic Education as a Welfare Service in Korea for the Improvement of the Elderly's Happiness Index

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Abstract

Purpose/ Research Question:

Well-being and emotionalism are emerging as new trends in an advanced society demanding dynamic changes. Hence, people are interested in physical and mental health, and the demands for beauty are also diversifying. Beauty services are provided satisfaction and happiness at the same time pursuing human instinctive beauty. Especially, skin care service not only changes the appearance but also enhances self-esteem, self-efficacy and stimulation of physical contacts to improve psychological well-being.

Meanwhile The aging phenomenon is progressing very rapidly all over the world. In particular, Korea has entered an aged society in only 17 years, and it is in the process of aging at the fastest pace in the world. Especially, as of 2017, Korea's aging index that the proportion of people aged 65 or over compared to the population aged 10-14, was also 107.3. It was the highest in the world. According to OECD statistics, Korea has the highest rate of suicide among elderly people. Elderly suicide is caused by despair, loss, helplessness, and depression. Although there are social welfare programs such as art therapy, music therapy, and laughter therapy to solve the psychological difficulties faced by the elderly, most Korean welfare is still limited to solving economic difficulties. So, it is required to develop a new welfare program that satisfies both emotion and sensibility have. It is one of good alternative to create the skin care program for the elderly and to educate the esthetician to practice it.

Currently, the skin care education program does not have a detailed education aimed at a specific floor but only a general education program for the human body is operated. In order to cultivate skin beauty experts in the future, it is necessary to tailor therapy subjects and education programs tailored to them. Especially, considering the seriousness of aging in Korea, it is essential to develop an education program that practice skin care program for elderly.

The ultimate goal of this study is to improve the happiness index of elderly people in Korean society undergoing aging rapidly. It is important to raise the happiness index of the elderly in Korea where the aging society is the fastest in the world and at the same time the elderly are suicide most.

Skin care services are a good way to increase the happiness index of the elderly. Currently, however, there are few programs in Korea that educate skin care service professionals targeting elderly people. Therefore, this study will investigate the need for esthetician education, which can professionally care for the elderly, and confirm its feasibility.

Key Literature Reviews (About 3~5 papers):

Modern society is aiming for life that pursues happiness, and elements that make happiness are diverse. Although the society pursues happiness, the elderly people in the Korean society have a high suicide rate in the world. Elderly suicide is mainly caused by psychological instability such as loss feeling and depression. Nonetheless, the welfare of Korean society is focused on solving economic difficulties, and there are welfare programs such as art therapy, music therapy and laughter therapy, but another intervention program is necessary.

Beauty services Among other things, there is a potential for the elderly welfare program in that the skin care service not only changes the appearance but also stimulates self-esteem, self-efficacy and physical contact, thereby providing psychological stability.

Design/ Methodology/ Approach:

This study aims to conduct a questionnaire survey of Estheticians in Korean. Based on the results, technical statistical analysis will be conducted. We analyze the questionnaire for Korean estheticians or the students of major in Esthetic and try to find out the needs of professional education and demand programs for the elderly.

(Expected) Findings/Results:

Skin care services will enhance the self-esteem and self-efficacy of the elderly and improve psychological well-being through tactile stimulation. The development of an education program for skin care professionals aimed at the elderly will also serve as a new intervention program to solve various problems of the elderly.

Therefore, the specialized education of esthetics for the elderly will contribute to increase the happiness index of the elderly.

Research limitations/ Implications:

This is a study of Korean estheticians or the students of major in Esthetic, and it is difficult to generalize the results because the subjects are very limited.

Keywords: Beauty service, Estheticians, Esthetic education, Aging society, Happiness index

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Digital Innovation adoption & its economic impact

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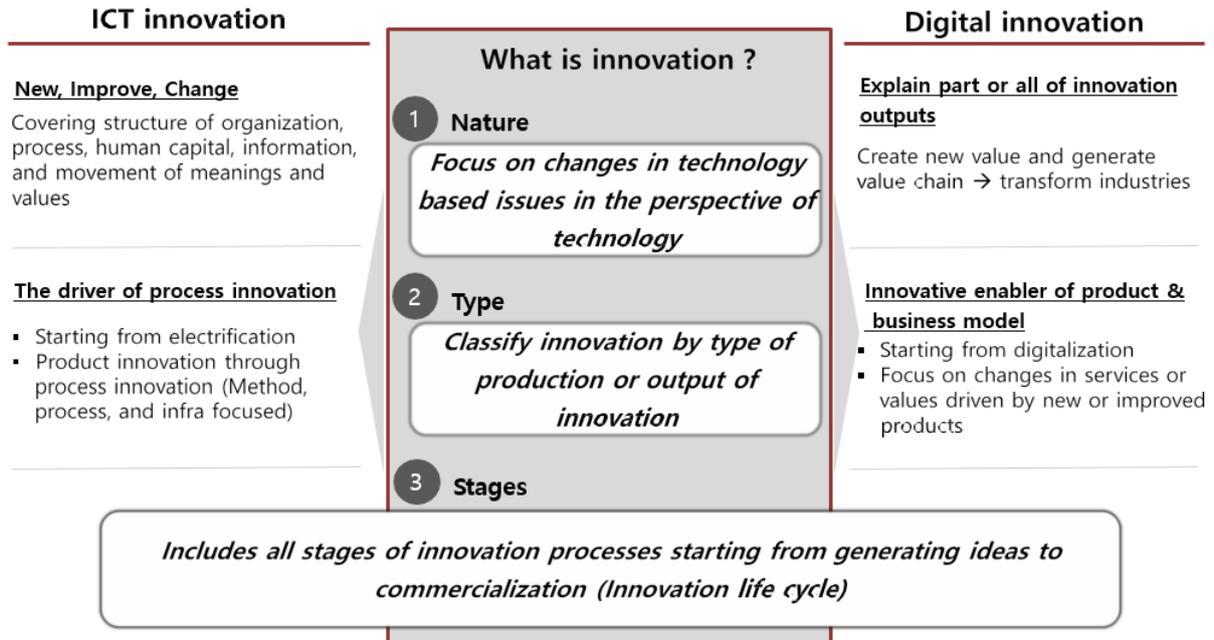
Prof. Sang Ok, Choi*

Purpose

Background	Purpose
<p>"Digital economy & future."</p>	<p>What is Innovation?</p> <ul style="list-style-type: none">▪ To understand ICT innovation and Digital innovation- approach through conceptual definition of innovation and innovation models
<p>1 Digitalization</p> <p><i>Transformation of traditional system</i></p>	<p>What are the differences?</p> <ul style="list-style-type: none">▪ Nature, type, stages of innovation in the perspective of ICT & Digital innovation
<p>2 Innovation & productivity growth</p> <p><i>economic impacts driven by technological innovation</i></p> <p><i>innovation vs ICT innovation vs Digital innovation</i></p>	<p>National innovation growth & impact</p> <ul style="list-style-type: none">▪ Build path analysis model considering national innovation factors, adoption/diffusion, and economic impacts by applying innovation theories
	<p>Practical implications</p> <ul style="list-style-type: none">▪ Measure the impact of ICT and Digital innovation in national level▪ Technological adoption production and its impact through ICT and Digital innovation

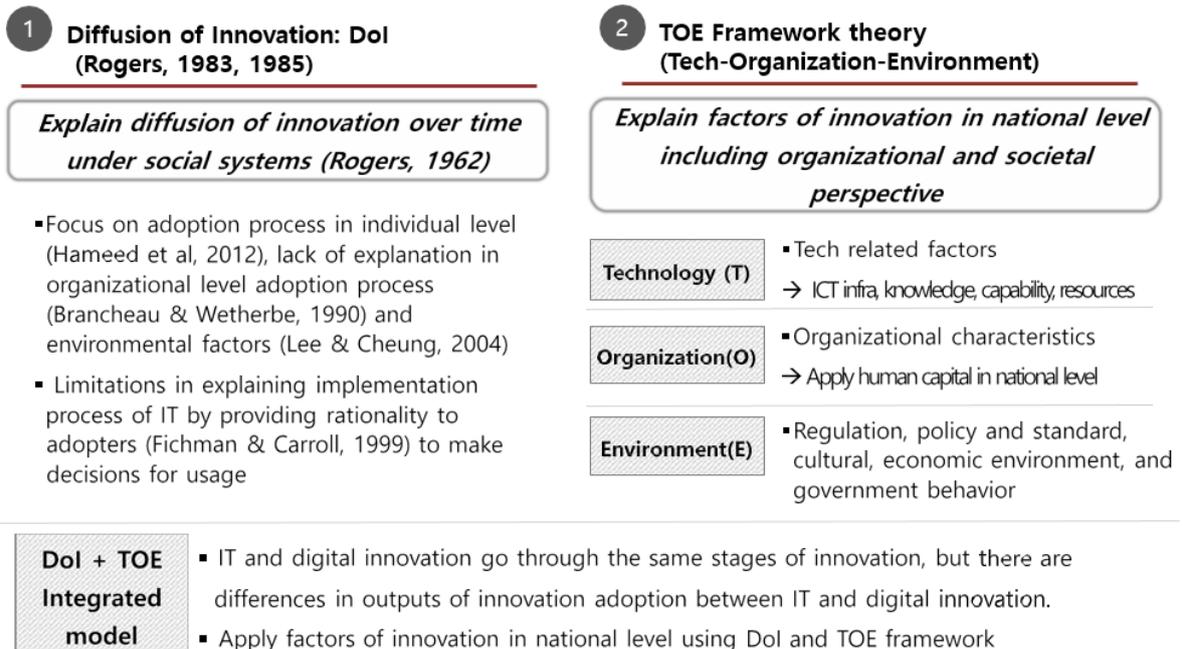
Definition – Innovation, ICT & Digital Innovation

The importance of innovation raises significant policy and strategic issues since it produces values and creates sustainable competitiveness (Bareghen et al., 2009)



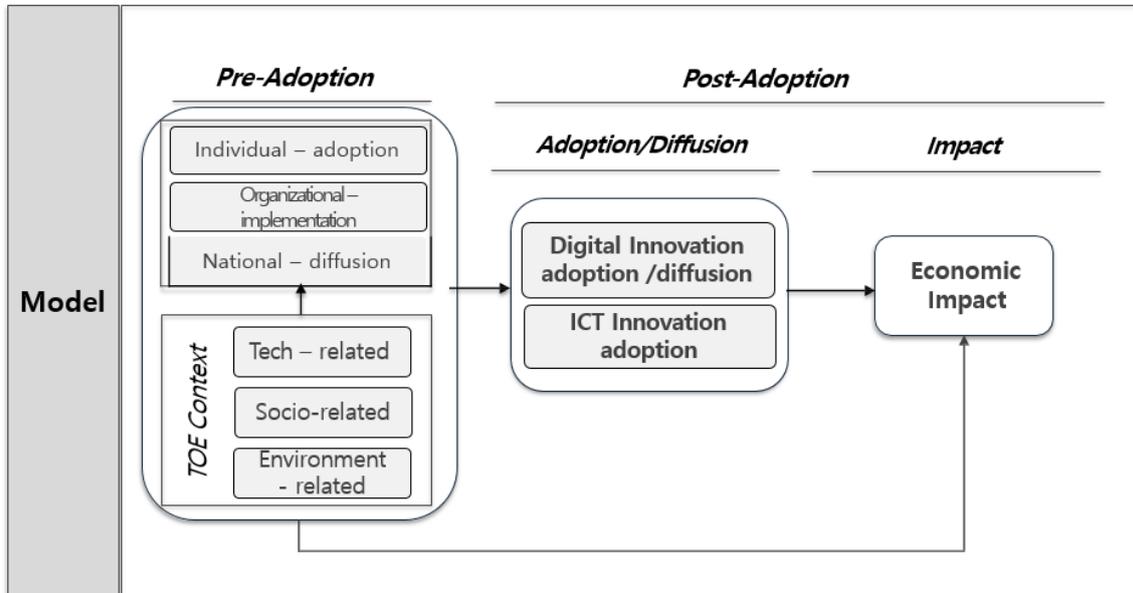
Innovation Research Theory

The most widely known theories are Dol and TOE Framework in innovation research



Research Design

Build path analysis model considering national innovation factors, adoption/diffusion, and economic impacts by applying innovation theories



<National innovation growth & impact model>

The effects of national level innovation driven by ICT and Digital

1. Direct effect of national innovation factors to economic growth
2. Indirect effect of national innovation factors to economic growth through ICT innovation and digital innovation
3. Total effects of direct and indirect path

Expect to give practical implications in building polices considering determinants of ICT and digital innovation, and developing index for measuring digital innovation.

- 1. There are issues whether digital innovation is in the same wave with ICT innovation, driver of rapid economic growth.**
- 2. There are lack of research papers in measuring digital innovation impacts.**
- 3. There are issues in developing index for measuring digital innovation impacts.**
- 4. The needs of developing new polices related to innovation since current policies are lag behind the speed of innovation.**

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25.

Social-oriented cooperation program
Development of economic and social effect measurement model

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Abstract

The Ministry of Education, the Small and Medium Business Venture Department, and the Ministry of Commerce, Industry and Energy are supporting industry-university cooperation through various programs, but there is no means to measure policy effectiveness. In particular, the LINC+ project, which is a university-based industry-academia cooperation support project, has been setting up key directions for bi-directional industry-university cooperation reflecting the demand of the local community and industry from 2017 and establishing and implementing the ESI (Economic Social Index) Therefore, it is necessary to develop a standard model that

can measure the effects of industry-academia cooperation activities on the local community and economy by using time series data centering on LINC+ participating universities.

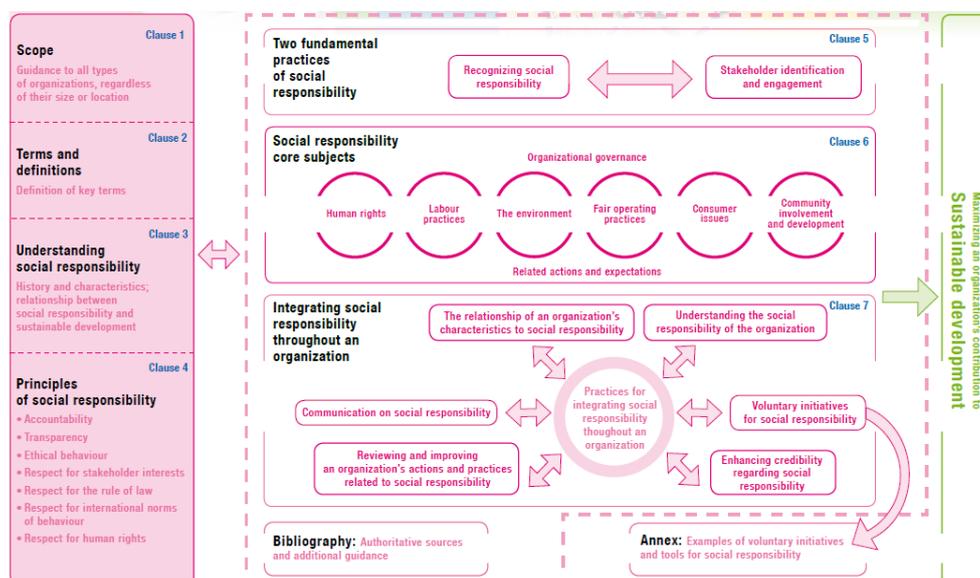
Key Literature Reviews

1. Community college evaluation through community development and cultural contribution

The contents of the paper published in the 2008 journals Higher Education are as follows. Jongbloed, Enders, and Salerno emphasize that the third role is emerging beyond the traditional mission and education and research that the university should carry out.

2. Social Responsibility (ISO 26000) International Standard

- ISO 26000 of the International Organization for Standardization
- Not only those companies that are merely profit-making organizations, but those that are applicable to both profit and non-profit organizations in all countries
- ISO 26000 The seven pillars consist of governance, decision-making transparency, human rights, fair labor practices, environmental protection, fair operation, consumer protection, and community participation and development.



Design/ Methodology/ Approach

Standardized Approach for Measuring Social Value

Social Return on Investment (SROI)

- It is a method to show the calculation of the social, environmental and economic value created by an organization in terms of monetary value of type.
- A broad social context that can include incomplete information that can influence decision making. It is a framework for measuring and calculating the concept of environmental value. SROI measurements may vary depending on the experience and contribution of the person or organization involved.
- Social value measurement by SROI analysis is spreading continuously and it can be confirmed mainly in Canada and the UK, and its use is increasing to evaluate social programs in many advanced countries such as Europe.

$$\text{SROI} = \frac{\text{The calculated economic value} + \text{The calculated}}{\text{Total Value}}$$

BSC, Balanced Score Card

It is a business performance measurement methodology jointly presented by Harvard Business School's Kaplan and Norton (1996). It is a performance measurement tool that uses strategy maps to determine how an organization's day-to-day business processes are related to achieving organizational goals.

(Expected) Findings/Results:

Develop a model for measuring the economic and social impacts of industry-academia cooperation activities

- Definition and type of industry-university cooperation

- Analysis and analysis of industry-academia cooperation activities centered on the financial support project of the Ministry of Education to establish operational definition and type of industry-university cooperation

- Development of measurement model for effectiveness of industry-university collaboration

- Development of quantitative indicators to analyze the economic and social effects of the above-mentioned industry-university cooperation activities on the basis of the actual condition of industry-university cooperation survey,

- Policy implications

- **Developing measures by measuring policy effectiveness**

- Although there is no objective measurement method for the performance, it is possible to verify the policy performance through this model and to suggest the improvement plan

- Improvement of goal-orientedness, policy goals and means (evaluation index), etc.

Research limitations/ Implications:

There are difficulties in deriving the joint ESI index results because the 55 local LINC + project teams are differentiated by regional reputation improvement.

Therefore, there is a need for a process of enhancing the area of characterization based on the indicators to be nationally oriented and mixing and evaluating them at an appropriate ratio.

Keywords: Industry-university cooperation , ESI(Economic Social Index), Social effect, LINC+

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International innovation collaboration in China

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Abstract

Purpose/ Research Question: International collaboration is very important in today's knowledge economy era, especially for the latecomers, such as China. In this context, enhancing international innovation cooperation is extremely important, and a dramatic growth of studies focus on international innovation collaboration. In addition to this important phenomenon which has important policy and practical implications, there are distinctive characteristics of international innovation collaboration which differs from domestic research collaboration. This requests a full understanding of international innovation collaboration as a field. As a result, international innovation collaboration meets more challenges compared with other kinds of research collaboration. This paper attempts to analyze China's international innovation cooperation from a more macro level. Combining theory with practice, we analyze the necessity of international innovation cooperation, China's practice and experience, and the status quo of China's international cooperation. At the end of the article, the paper gives suggestions on the problems existing at the present stage. At the academic level, this paper also collates and forecasts the future research areas of international innovation cooperation.

Key Literature Reviews: In academia, discussions on international innovation collaboration are emerging, and more and more countries believe that technology (S&T) collaboration is a key way to promote and maintain their global innovation competitiveness (Glänzel, 2001; Hwang, 2007). For example, Niu and Qiu (2013) analyzed 211,946

articles on Web of Science from the perspective of amount, authors, Countries, discipline fields and journals, and described the growth and distribution of Chinese international research collaboration (IRC). Chen et al.'s research (2019) analyzed the development of IRC research through bibliometrics and finds that the international research cooperation field has gone through three stages of development: the germination period (1957-1991); the fermentation period (1992-2005) and Takeoff period (2006-2015). Zhang and Guo (2017) analyzed the factors affecting China's international research collaboration by using the gravity model. Other key references include:

Yun, J., Zhao, X., Yigitcanlar, T., Lee, D., & Ahn, H. (2018). Architectural Design and Open Innovation Symbiosis: Insights from Research Campuses, Manufacturing Systems, and Innovation Districts. *Sustainability*, 10(12), 4495.

Amitrano, C., Tregua, M., Russo Spena, T., & Bifulco, F. (2018). On Technology in Innovation Systems and Innovation-Ecosystem Perspectives: A Cross-Linking Analysis. *Sustainability*, 10(10), 3744.

Kim, S., & Kim, E. (2018). How Intellectual Property Management Capability and Network Strategy Affect Open Technological Innovation in the Korean New Information Communications Technology Industry. *Sustainability*, 10(8), 2600.

Design/ Methodology/ Approach: According to the research of international scientific and technological cooperation by many domestic and foreign scholars such as Philip Shapira, it is generally believed that the co-authored paper is an important carrier for measuring international innovation cooperation. Through the search of the "Web of Science Core Collection" database in Web of Science, the search term "CU=(CHINA OR PEOPLES R CHINA)" is used. [This article attempts to specifically cover Hong Kong and Macao, and excludes the search situation in Taiwan, but the difference between the results is small. The literature type is restricted to "Article" for retrieval. It can be concluded that Chinese scholars participate in the total number of papers published, and then use the "analyze search results" and "refined search results" functions in the WOS database to obtain the cooperation between China and other countries. While combing the practice and experience of China's international innovation collaboration, this paper also carried out some work of text collection and text analysis.

Findings/Results: From the current situation of China's international innovation collaboration, the overall cooperation scale shows a significant upward trend. From the perspective of cooperation intensity, it can be seen that although the cooperation intensity of

China is also very active, it is still at a low level. There is a certain gap between China and the world's leading developed countries. It can be argued that although China has initially had the ability to plan and allocate resources from a global perspective, there are still some deep-seated problems that need to be addressed to effectively promote international innovation cooperation. First of all, due to the small scale of the investment in basic research in China, it has limited international innovation cooperation to a certain extent. Secondly and more importantly, the imperfection of China's existing intellectual property protection system is not conducive to the construction of a good innovation environment, and it is the main factor hindering the flow of global innovation resources gathered into China. At the same time, in China's overall research atmosphere and research integrity environment, there is still a big gap with developed countries, which is not conducive to building a healthy and innovative environment in China.

Research limitations/ Implications:

(1) Strengthening international collaboration in source innovation

Strengthening international collaboration can promote the intersection, integration and mutual penetration of basic research in disciplines and fields, and conduct research on scientific issues across regions and globally.

(2) Improve the environment for intellectual property protection

It is necessary to establish a targeted approach to intellectual property management for international innovation collaboration. We should increase the cost of infringement in collaborative innovation, reduce the cost of safeguarding rights, and effectively protect the enthusiasm of innovators.

(3) Sound research and integrity environment

It is necessary to strengthen the integrity management of scientific research activities, establish a sound review and management system for scientific research achievements, and strive to deepen the reform of scientific research evaluation system. The construction of scientific research credibility requires not only the efforts of scientific research institutions and scientific research personnel, but also the active promotion at the national level.

(4) Promoting the opening up of the national science and technology plan

The opening up of the national science and technology plan can promote the improvement of China's scientific research system. By drawing on the experience of developed countries, we

can optimize the allocation of scientific and technological resources and the talent incentive mechanism to attract more international scientific and technological resources into China.

(5) Strengthen the layout of the international innovation cooperation network

The top-level design and strategic layout of the international innovation cooperation network can be strengthened by establishing overseas contacts with a number of countries. The establishment of overseas contact institutions can support researchers to carry out various forms of mutual visits and exchanges, in order to fully understand the research system, scientific research model, scientific research project management system and innovation of the other country.

This study sorts out China's international innovation collaboration from a macroscopic perspective, largely from the perspective of national development strategy, but lacks the collaboration between enterprises, and the private science and technology collaboration is also an important part of international innovation collaboration. How to incorporate this part into the analysis in future research is a problem that needs to be solved. In addition, the measurement of research funding for international collaboration projects is also one-sided, because this article selects the financial support in the special program of international collaboration, and the international collaboration expenditures that may exist in some non-special projects are not taken into consideration.

Keywords: International innovation collaboration, China, bibliometrics

Beijing as a Regional Innovation System: a case study of the ICT and software industries

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Abstract

Purpose/ Research Question:

- Globalization has come hand-in-hand with an increased role played by some innovative regions in the global economy (Yun et al., 2015; Amin & Thrift, 1994; Asheim & Isaksen, 1997; Chaminade & Vang, 2008; Cooke, 1992, 2001, 2016, 2017). It has been increasingly acknowledged that a considerable amount of innovation activity takes place in the form of local or regional agglomerations in the past decades (Inkinen, 2015; Cooke et al. 1994).
- Beijing, one of China's biggest cities, is a typical Case, its configuration has transitioned from monocentric to polycentric (Feng, Wang, & Zhou, 2009; Qin & Han, 2013; Zou, Mason, & Zhong, 2015). It is granted for creating special

zone for development including industrial development zones, satellite towns and new towns.

- Information and communication technology (ICT) is one of the most dynamic market sectors in China's economic boom (export. Gov, 2017).
- The software industry is deemed an ideal target for a developing country to integrate into the world information and communications technology (ICT) market(Li& Gao,2003)

Purpose of this study: To describe recent Beijing ICT and software clusters in Beijing.

Literature review

The concept of Regional Innovation Systems has been gaining much attention from policy makers and academic researchers since the early 1990s (Cooke,1992), deriving from two main bodies of theory and research, the regional science and the systems of innovation.

Cooke (2001a) drew the findings from previous studies and identified three important dimensions: infrastructural, institutional, and organizational ones.

Su et al. (2015) adopted Cooke's model to analyse the biotechnology innovation system in Taiwan.

Methodology:

An embedded single case study approach: Select 3 innovation clusters in Beijing; in literature review stage, personnel interviews will be scheduled early next year.



Sources: Zhenshan, Jianming, Henk & Richard (2013)

(Expected) Findings/Results: Primary findings

Zhongguancun Haidian park

-Infrastructural dimension :

a. public financing: Preferential treatment as it was the first science park in China and located in the capital city, such as reduced income tax, zero tariffs and loans to support ZGC's development (Wei & Yu, 2006).

b. private financing: Over 90 per cent of the enterprises in ZGC are private shareholding firms, the rest being state-owned and joint ventures (Wang & Zhao, 2006); Self-financing has been the main source for private firms. The financing has been limited: 76 per cent of the firms rely on internal sources (Wang & Zhao, 2006) and only 13 per cent received venture capital investments.

c. Regional university-industry strategy: Proximity to the Chinese Academy of Sciences (CAS) and the two leading universities, Tsinghua University and Peking

University in the Haidian district. Peking University and Tsinghua University created over 30 and 40 high-tech firms respectively; The Institute of Computing Technology of the CAS alone set up 13 firms including the Legend Group (now Lenovo) (Tan, 2006). The majority patent applications are filed by universities and research institutes (OECD 2008).

-Institutional dimension: Interactive learning: National or provincial research institutions and universities are constructing a cooperative atmosphere for knowledge spillovers; the mobility of highly skilled entrepreneurs across national borders challenges the traditional dominance of existing studies on international knowledge spillovers

-Organizational dimension: Digital entrepreneurship ecosystem is defined as the ICT enabling infrastructure that supports the cooperation, the knowledge sharing and the building of a business ecosystem (Davidson & Vaast, 2010); the forefront of ICT innovation – accounted for around 38 per cent of total patent applications in Beijing (ZGC Administrative Committee, 2010). But mainly based on indigenous firms for ICT innovation, localizing the MNCs' computer products towards the domestic market (Zhou, 2008). Because it's core incubation centre with technologies and high-tech employees, it's the AI technology cradle and the core area. AI Industry Development Alliance was established at the AI Industry Development Conference in ZGC Haidian Park, Beijing, on July 26 (Chinadaily, 2018) .

Beijing economic- technological development area (Beijing E town)

-Infrastructural dimension:

a. Financing: China IC Industry Investment Fund (CICF) is established to support domestic IC supply chain;

Together with local government and private equity, total IC funds have reached USD 74 billions. China IC industry keeps double digit growth for more than 10 years in all sectors of semiconductor industry including design, manufacturing and packaging; a viable financing system that support the industry with 12 IC industry-

specific investment funds that totaled more than RMB 160 billion

b. Regional university: industry strategy: SMIC has established the Institute of IC Pilot Technology in cooperation with XMC, Tsinghua University, Peking University, Fudan University and the Institute of Microelectronics of the Chinese Academy of Sciences. It is in order to accelerate the development process of advanced basic technology.

-Institutional dimension: Shanghai-based Semiconductor Manufacturing International Corporation (SMIC), the largest chipmaker on the Chinese mainland, set up a plant in Beijing's Economic-Technological Development Area (or E-Town) as early as 2004. After the completion of Phase II of SMIC, its total capacity will be about 120,000 pieces. Its completion will make the development area the most important IC industrial base in China. Representative enterprises include SMIC, Vention, NMC, Beijing Express, Sumitomo Chemical, Infineon Technologies, Chiponeic and Solomon Systech; The integrated circuit industry(IC) in the development area accounts for one-third of Beijing's total;

Interactive learning: 2018 IC world conference is held in Beijing E-town. More than 300 experts, scholars and business leaders from the world's top universities, research institutes and integrated circuit companies will focus on trends of the IC industry ;

-Organizational dimension: Different integrated circuit enterprises carry out upstream and downstream cooperation and clustered development, thus forming a relatively complete IC industrial cluster. Many complete machine and system enterprises have clustered in the area, like BOE, Nokia. A good ecological environment has been created for cooperation between complete machine enterprises and chip enterprises.

Huairou science park

-Infrastructural dimension

The world's largest 5G test field with about 30 telecom base stations has already

been established in Beijing's Huairou District.

-Institutional dimension

Located near the Institute of Electronics of Chinese Academy of Sciences in Huairou District;

It is estimated that in 2030 the science city will be home to over 23,000 faculty members and employees of the Chinese Academy of Sciences, about 24,000 postgraduates, postdoctoral researchers and foreign students, as well as 2,110 visiting scholars.

-Organizational dimension :

China Mobile, Huawei, ZTE as well as a number of foreign companies have completed China's second phase of 5G testing. Huawei used C-Band base stations, C-Band terminals, and the company's existing 5G bearer and core networks in Huairou to verify network performance across diverse NSA scenarios. The tests examined cell throughput, user experienced data rate, mobility, network latency, key 5G solutions, and essential service procedures.

Research limitations/ Implications: Qualitative nature.

Keywords: Regional Innovation System, Industrial cluster, Beijing

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Managerial Compensation and Environmental Innovation

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Abstract

The aim of this study is to exam the causal relationship between employee compensation structures and P2 adoption. Previous research focuses on whether firm characteristics, pressure from anticipated stringency of regulation and stakeholders, and the practice of Total Quality Environmental Management are responsible for the adoption of P2. Ashford (1993) argues that managerial attitude toward both environmental quality and technological change decides the likelihood of P2 adoption. Therefore how to motivate executives to embrace these practices is critical to the success of P2 program.

The principal-agent conflict arises when executives act to maximize their own interest at the expense of shareholders. To ameliorate the disparity between the executives' concern for human capital return and the firm's concern for equity return, shareholders are advised to link executives' wealth to firm performance (Jensen and Mecking, 1976). The use of the equity-based compensation in the form of stock and stock options is gaining its ground in recent years, as shareholders are tried to align firm's performance with executives' utility maximization objectives (Murphy, 1999; Perry and Zenner, 2000). Higher sensitivity of executives' wealth to stock performance motivates executives to perform more effectively as the gain from hard-working can be delivered directly through stock price appreciation. However, compared with well-diversified shareholders, executives whose wealth highly depends on the firm performance are expected to display higher degree of risk aversion. Smith and Stulz (1985) argue that risk-averse managers are more likely to forgo positive net-present-value projects accompanied by high risk. To encourage managers to embrace risk-enhancing investment which is expected to bring substantial increase of the shareholder wealth, literatures proposed the use of the compensation structure that is convex to stock return (Jensen and Mecking, 1976; Haugen and Senbet, 1981). In other word, shareholders introduce compensation portfolios to managers which is sensitive to the stock price volatility, and in turn motivates managers to make ideal investment decisions albeit the possibility of greater uncertainty.

This study apply delta and vega to instrument for the linkage between executive wealth and stock performance. Vega is a measure of the sensitivity of executives' equity-based portfolio to the change in stock price volatility, and delta is the sensitivity of executives' equity-based portfolio

to the stock price performance. Previous research finds that higher vega lead to riskier policies in terms of R&D investment, leverage level, and firm concentration. However higher delta prohibit risk-taking policy which can potentially reward firms with competitive advantage in the long term.

Pollution Prevention (P2) Practices play an important role in US environmental policy. P2 focuses on source reduction rather than conventional approaches in pollution control such as recycling, treatment, and disposal. Porter (1991) suggests that the success of P2 helps adopting firms to compete in the global market without sacrificing environmental quality. At the same time, firms can build up an environmentally-friendly image around its stakeholders by adopting P2. However, P2 may impose higher risk to adopting firms that some P2, in particular the adoption of P2 regarding equipment and raw material changes may result in poor product quality and operation inefficiency.

I obtain annual facility-level P2 adoption and other toxic release information from Toxic Release Inventory (TRI) database, and aggregate this information into firm-level data by company name. I compute vega and delta followed the procedures developed by Core and Guay (2001). Where the data is from Standard and Poor's Execucomp database which contains salary, bonus, and total compensation for the highest paid employees. The database covers firms in the S&P 500, S&P Midcap 400, and S&P Smallcap 600. Information regarding individual firm's financial characteristics is from Compustat database. After merging both dataset, I have a panel of 1321 observations which includes 191 firms over the period of 1992 to 2003 (I keep the data from 1992 to 2003, for that majority of the P2 adoption occurred after 1992).

Due to the count nature of my dependent variable (the the adoption of P2 count is a discrete number), I applied a poisson regression with fixed effect to test my empirical models. Apart from the major determinants of delta and vega, I include several controls which are proved to be important in P2 adopting decision to the empirical model. R&D intensity measure a firm's capability and attitude of taking novel actions to pollution problem. Retained earnings intensity is to proxy for financial capability, and herfindahl index is to measure competition intensity. I also included year-fixed effect to control for the unexpected macroeconomic event that may influence the p2 adoption decision.

Empirical results suggest that a higher vega bring about more P2 adoption. However, a higher delta lead executive to focus on the present, and hold back on P2 adoption. After we categorize P2 into two groups based on the stage of operational processes they involve, we find that executives will less likely to undertake P2 involving procedural change if their delta is low. This result is unexpected. However, executives with higher vega are more willing to participate in P2 involving iuput and equipment change.

This study is not without limitation, a major weakness is the decision on P2 adoption may involve more than the highest-pay executives in our model. We have to take more top

executives into consideration in the future.

Keywords: executive compensation, corporate social relationship, pollution prevention, delta and vega.

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The study on the effect of patent retrieval behavior on market awareness of teachers in the technical and vocational colleges and universities

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Abstract

Purpose/ Research Question:

With the Bayh–Dole Act of 1980 by the United States Congress, Taiwan also formulated the "Fundamental Science and Technology Act" in 1999. The purpose of above program was to promote the academic commercialization of the university, thus encouraging university scientists to patent and license their innovation.

The study takes an information search behavior's perspective and applies the theory of information search behavior as well as knowledge management to explore patent retrieval behavior, and the factors influence professors or researchers in the technical and vocational colleges and universities patent retrieval behavior. However, although improving market awareness enables teachers in the technical and vocational colleges and universities quickly identify opportunities in the market, developing new technology in order to meet the need of market is crucial. Therefore, the purpose of this study is to explore the correlation between teachers in the technical and vocational colleges and universities that patent retrieval behavior and market awareness capabilities.

Key Literature Reviews (About 3~5 papers):

With the rise of knowledge-based economy since 1980, intangible assets have become the source of competition in the industry. The number of patent applications from academic is constantly growing. Through the patent search, besides affecting the commercialization of enterprises, but also reduce the risk of patent invalidation. Therefore, prior information seeking and retrieval is particularly important, the user finds that the demand for information, resulting in information seeking behavior in terms of academic.

Review of past literature (Wilson, 1997 ; 1999; 2002 ; Hunt, et al., 1986 ; Ellis, 1989).Information seeking can be seen as the user awareness of knowledge of the outside world to understand the lack of feeling the information needs, and then the purpose of seeking the information needed. The way and tactics of seeking are all influenced by personal characteristics, tasks, search system, search field, search environment and so on.

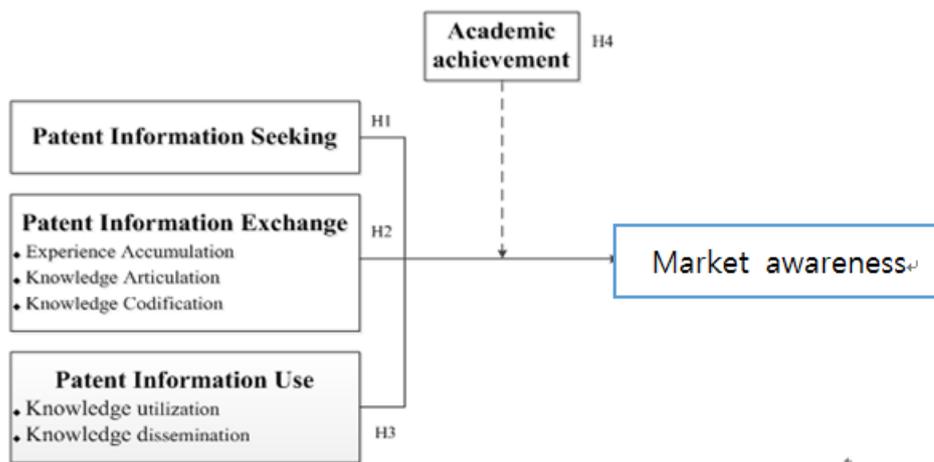
Explain when a user has information needs, would start an activity mechanism: stress/coping theory, propose to "fill the gap" by implanting the notion of activating mechanism. Using the stress/ coping model as an example of a theoretical method to such a mechanism, allowing. However, for sources of motivation other than stress to exist. In doing so, we fill the gap in terms of patent retrieval behaviors.

Design/ Methodology/ Approach:

The study surveyed for all professors and researchers who from faculty of engineering at the university of science and technology, a total of 2320 questionnaires were distributed and 130 questionnaires is validated. The effective rate was 5.6 %.

This study is based on information seeking, including patent information seeking, patent information exchange, patent information use. Through the obtained dimension to analysis the correlation between entrepreneurial alertness ability. And use academic achievement as Moderating Effect.

Comprehensive theoretical and research results of related literature, this study Proposed research framework as depicted in figure.



This study suggested that the information seeking behavior and entrepreneurial alertness enhances the commercialization achievements. Thus, the research hypothesized:

H1: Patent information seeking has a significant impact on market awareness.

H2: Patent information exchange has a significant impact on market awareness.

H2-1 There is a significant positive correlation between Experience Accumulation and market awareness.

H2-2 There is a significant positive correlation between knowledge articulation and entrepreneurial alertness ability.

H2-3 There is a significant positive correlation between knowledge codification and market awareness.

H3: Patent information use has a significant impact on entrepreneurial alertness ability.

H3-1 There is a significant positive correlation between knowledge utilization and market awareness.

H3-2 There is a significant positive correlation between knowledge dissemination and market awareness.

H4: Academic achievement has a moderating effect between Patent retrieval behavior and market awareness

(Expected) Findings/Results:

The results were as follows: There is a significant correlation between patent retrieval behavior and market awareness capabilities. All experience accumulation and knowledge dissemination of patent retrieval behavior have a significant impact on market awareness, but have no significant impact on knowledge articulation, knowledge codification, and knowledge utilization. Finally, we believed that these results enable the teachers in the technical and vocational colleges and universities know to improve market awareness on the circumstance of retrieval behaviors.

Research limitations/ Implications:

The study also finds that retrieval behaviors of university patents is encouraged by academic achievement. Without appropriate patent retrieval behaviors, patent commercialization of Universities patent does not lead to greater likelihood of licensing university patents. These findings, some of which are unexpected, have implications for theory and practice.

Keywords:

Patent retrieval behavior, commercialization of patented, Patent commercialization capabilities, knowledge management, market awareness

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Artificial Intelligence Road Survey System for detecting Road Defects

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Abstract

A road defects are one of the significant factor for the car driving safety. Depending on the road damage condition, it can cause serious risk to vehicles or drivers, and it also feels an uncomfortable driving conditions. If the autonomous vehicles run on the road in the coming near future, we need to be prepared for how to deal with poor road environments such as road potholes, road cracks etc. Especially, a pothole is a one of the greatest threat to vehicle drives. It causes an accident by sudden steering of the vehicle wheel, forcing an enormous stress on a vehicle tire or making a hard turning in a vehicle by late detection. It is crucial to find where a road defects like pothole is on the pavement. The autonomous driving technology must prepare a technique of recognizing a poor road surfaces. Therefore, this paper proposes an image-based automatic detection system for road defects. There are kinds of the road defects detecting methods, such as using a camera sensor and, 3-axis acceleration sensor and laser scanning systems. All of sensing ways have the pros and cons. This paper is based on an image processing system with the camera sensor. We propose advanced road defects detection technology using Artificial Intelligence.

Introduction

The number of potholes has increased because of poor pavement materials and maintenance systems. In Korea, according to the Ministry of Land Infrastructure and Transportation, the number of potholes was estimated to be approximately 90,000 and 180,000 in 2008 and 2013, respectively. In addition, 4,223 car accidents caused by potholes occurred between 2008 and 2013, and pothole maintenance cost increased from \$6 million to \$113 million over this period. To address these problems, the Seoul Metropolitan Facilities Management Corporation established a new policy in 2013 that stated that potholes should be repaired within 24 hours of detection [1].

Vibration-based methods were used to automatically detect potholes by a Seoul city public bus

fitted with Global Positioning System (GPS) sensors. However, the detection accuracy was unsatisfactory because the vibration signal patterns were similar to those of certain objects such as manholes and speed bumps. Moreover, vibration data was not collected frequently because most bus drivers avoided driving directly over potholes. Vibration-based methods use the gradient variation of accelerometers, which can be developed at low cost using simple algorithms.

Vibration-based methods detect potholes by recognizing certain signal patterns of an accelerometers attached to a vehicle [5, 6]. The major problem of these methods is that drivers typically do not drive directly over a pothole. Thus, the method cannot even measure the vibration signals of potholes. Laser scanning-based methods can produce precise three-dimensional (3-D) cloud points of a road surface [7]. They not only detect potholes but also measure thin cracks on asphalt roads. However, these methods are not suitable for pothole detection because of their high cost and poor scalability. These systems are suitable for road profiling in detail over a short distance. Vision-based methods cost less and provide greater accuracy than laser scanning-based and vibration-based methods, respectively. This paper proposed an image processing system based automatic road damage detection system for Autonomous Vehicle (AV) and showed the test result conducting road driving test. A pothole is a structural failure in a road surface, caused by failure primarily in asphalt pavement due to the presence of water in the underlying soil structure and the presence of traffic passing over the affected area. The feature of a pothole is bowl-shaped holes of various sizes in the pavement surface with at least dimension of 150mm [8]. Such a pothole is mostly created in raining seasons and winter season. First, when precipitation adds moisture or water on a soil surface. Second, the temperature drops down enough to create frost heaving, a soil surface arise and breaks an asphalt surface. Third, thawing creates a gap between a soil surface and an asphalt surface. Fourth, traffic breaks a pavement by giving a pressure on a surface. When a pothole is created, it causes a serious damage to the vehicle by steering the wheel, breaking the wheel function or shocking on tires. The problem of potholes is not only the vehicle gets in trouble but also a cost in an accident compensation to the government and highway traffic companies is increasing if there is a latency in patching potholes. Annually, as the number of vehicles is increasing, the number of potholes is also increasing. Consequently, patching potholes within a short time saves not only the lives also decreases the expense of money in an accident compensation. The multilayer perceptron is one of the old fashion technics in the feed-forward artificial neural network (FFANN). However, it still has reasonable performance in analyzing data. In China, for a cracking detection, back propagation neural network, which is based on FFANN, was used to detect cracks in the pavement with sensors in the smartphone [9]. This method does not use visual images in order to detect cracks. However, it proves the application of FFANN into a pavement distortion system.

The deep convolutional neural network (DCNN) is a type of FFANN that designed to require minimal preprocessing in analyzing visual imagery. DCNN has return good performance in image classification problems with reducing the computational cost [10].

Automated Road Defects Detection System using Artificial Intelligence

The proposed system can detect various road damage such as pothole, big crack, drop, manhole, etc. The proposed algorithm consists of several steps: candidate extraction and decision. In the candidate extraction step, road damage candidate regions are separated from the background. Final damage object regions are determined in the decision step.

This system consist of 3 step; Firstly, image pre-processing step conducts converting from color image to gray scale(RGB-Y). After it finished the image pre-processing, process the next step that conducts detecting the candidate object extraction. Finally, it makes a decision the road damage object from several candidates.

Generally, a road surface consists of shades of gray image, so a three-channel color space is not needed, which reduces the computational complexity. To obtain the gray scale image, a conversion from RGB color space to YUV is performed as below.

$$Y = 0.299 \cdot R + 0.587 \cdot G + 0.114 \cdot B \quad (1)$$

where R is red, G is green, B is blue, Y is luminance, U is the chrominance of red, and V is the chrominance of blue, respectively. Only the Y value is used for further detection processing. This system is the parallel processing using super pixel, wavelet energy field and differential. The super pixel is clustering algorithm that clustering with the similar pixel. After finishing the clustering process, it makes the outlines of cells which are clustered pixels. The region of the pothole is rugged, the asphalt pavement is similarity region. So, we can segment the pothole from the outlines of super pixel's cells by checking polygonal of the super pixel's cells. The differential method is based on similarity of asphalt pavement. The pothole, a road text and road lines are not continuous. Therefore, if we get the frame differential, it highlights the dissimilarity objects. To get more distinguishable highlighted image. Accumulating differential and subtract the first frame and second frame, then one more subtracts the second image with the result of the first and second differential. Detecting the pothole with three methods intersections.

While driving a vehicle, the pavement including distortions does not have many distinct features than other nearby objects like vehicles, street signs and pavement markers. We used smartphone camera mounted on a car window. Placing the camera at the front windshield of the vehicle to get detailed textures of the pavement. To reduce the effect of the unwanted objects, we set a Region of Interest(ROI) that only concentrates on in front of the pavement. Then we crop the interesting area where to be focused. Fig. 1 shows how we cut to set the ROI area Cropped frames are preprocessed into two labels; pothole and not-pothole. Consequently, we train evaluate cropped

frames with models in DCNN



Fig. 1. An input frame of camera marked with Region of Interest in the red box

Experiments Design and Result

For testing the accuracy of the system, we used the asphalt pavement video where the expressway and city road in Korea. Then the camera was set on the front mirror. The camera device was Samsung Galaxy S7 and quality of the video was 1920 x 1080, 30 fps. The region of interest (ROI) was 800 x 200 pixels which included the asphalt pavement. The total recorded time is approximately 1minute 30 second equivalent to 38137 frames. The video included 43 potholes. Testing system was running on windows 10 pro 64bit, i7-4550U (1.50GHz), 8 GB RAM, visual studio 2015 and OpenCV 3.2. Fig. 3(a) represents a detecting system mounted in a car. The result of experiment our system detected the 40 target objects in a total of 43 objects. The miss detection, such as the asphalt pavement marking was 378 of total 1074 detection. Following figure showed the success case of detecting the object. Figure showed failure in detecting potholes. While the system working the result, processing speed is about 10 fps. Therefore, our system had 93.06% accuracy, 35% miss detection. We proposed automatic road damage detecting system based on image processing, using by saliency, superpixel, frame difference etc. We tested the system with the Korean highway asphalt pavement. The system's accuracy was 93.06%, miss detecting is 35%. Using the car's black-box can set our system and checking the location with GPS. This paper focused on the development of a highly detectable system. However, the results of the study showed a relatively high rate of false detection. The examples of false detection are as follows. Future research needs to be done to reduce the false detection rate.

Conclusion

We proposed an automatic road defects detecting system using image processing based artificial intelligence. We achieved about 90% correct detection rate. So, It is applicable in an autonomous vehicle. In future, machine learning algorithms such as CNN will be applied in the proposed algorithm in order to improve detection accuracy.

Acknowledgments

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Keywords: road defects, potholes, image recognition, artificial intelligence, autonomous car

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A Study on the Inequity Between the Housing Location and the Commuting Accessibility in the Socially Vulnerable Classes

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Abstract

Purpose/ Research Question

Purpose: The purpose of this study is to classify the households by age of the household owners, to calculate the commuting accessibility indicators for each household type, and to analyze the spatial equality between the residential location and the commuting accessibility by group.

Research Question: Commuting accessibility is closely related to quality of life as an indicator of the convenience of commuting activity that could be essential to each household's life. Therefore, households regard commuting accessibility as an important indicator in determining where they live. This study aims to classify the households using demographic factors and determine which types of household have weak commuting access, and to identify whether there is imbalance among the household types.

Key Literature Reviews (About 3~5 papers)

1. A Study on Smart City: 'Smart City' is drawing attention in order to improve the problem of inefficiency in urban areas and to maintain sustainable urban management. Smart City is a new urban strategy that efficiently utilizes existing infrastructure to solve urban problems at low cost and pursues sustainable urban development through city management. (Lara et al., 2016; Trindade et al., 2017; Chang et al., 2018)
2. A Study on calculation of accessibility: Hansen (1959) proposed a method of calculating the degree of access by using the inter-regional toll time and the number of jobs distributed in each region as variables. This study used Hansen (1959)'s accessibility estimation methodology to calculate the commute access for each region. Many researches have been conducted on the potential of the residence in the research field related to the determination of the location of the residence. (Yi & Lee, 2014; Lee & Yi, 2015)
3. A Study on spatial equity: Jang et al. (2017) calculated local public transport approaches

and used the Gini coefficient to calculate spatial equity. In particular, they compared the equity indicators of each mode by dividing public transport into buses and subways, and predicted changes in spatial equity indicators in the subject area due to the extension of the future subway lines.

4. A Study on vulnerable classes: Yi (2016) and Lee. et al. (2013) conducted a study on the housing condition of the socially vulnerable classes in Korea. The study analyzed residential location characteristics induced by socioeconomic conditions of the socially vulnerable classes

Design/ Methodology/ Approach

Design

1. The potential local commuting accessibility is calculated by transportation mode.
2. We classify the socially vulnerable households based on age of the household owner and analyze on the spatial distributed status by household type.
3. The commuting accessibility in areas where socially disadvantaged households are located are derived. And, we analyzed from the perspective of spatial equity to how they differ from other types of households.

Methodology

1. Commuting estimation approach: Potential accessibility

$$A_i^m = \sum_j W_j \cdot F(T_i^j)$$

A_i^m : Accessibility to i area by means m

W_j : Number of opportunities(jobs) in a region j

F : Resistance function

T_i^j : Travel time from i to j

2. Methodology for Calculation of Accessibility by Household Type weighted as residence rate of household type

$$Acc_k^m = \sum_i A_i^m \cdot R_i^k$$

Acc_k^m : Accessibility of household type k by means m

A_i^m : Accessibility to i area by means m

R_i^k : The residence rate of household type k in i

Approach: Horizontal equity and Vertical equity

Litman (2006) stated the studies on transportation equity can be classified into two general types of research, that is, horizontal equity and vertical equity. Horizontal equity concerns the distribution of impacts between individuals and groups considered equal in abilities and needs. According to this type of equity, equal individuals and groups should receive equal shares of resources, bear equal costs, and be treated the same in other ways. In contrast, vertical equity

concerns the distribution of impacts between individuals and groups that differ in abilities and needs by income or social class. By this definition, transportation policies are equitable if they favour economically and socially disadvantaged groups, compensating for overall inequalities. This study analyzed the spatial equality of commuting access for each type of household based on the above two approaches.

(Expected) Findings/Results:

Finding

1. The commuting accessibility of each region was derived for different values by transportation mode.
2. Regional distribution patterns varied by household type.
3. Commuting accessibility differed for different types of household

Results

1. The analysis of the spatial equity of the commuting accessibility by household type showed that socially vulnerable classes had relatively poor access.
2. Especially, it was confirmed that more vulnerable classes reside in areas where access to public transportation is poor.
3. From the viewpoint of vertical and horizontal approach, we assessed and evaluated the equity of socially vulnerable classes.

Research limitations/ Implications:

Limitations

1. In estimating the commuting accessibility for each region, it did not reflect the different travel patterns for each household type of household (especially, the socially vulnerable classes).
2. There was a lack of consideration of the purpose of other travel than commuting in diagnosing and evaluating the equity of location by household type.

Implications

1. We have proposed a methodology for analyzing and evaluating social equity, in a spatial and quantitative way through a rational and systematic way.
2. The methodology of this study can diagnose the current residential situation in the Seoul metropolitan region of Korea and present the direction of the housing welfare and related policy by analyzing the location of socially vulnerable classes based on the commuting accessibility.

Keywords: Accessibility, Spatial Equity, Household Type, Socially Vulnerable Classes

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32.

Environmental potentials of best available techniques - the case of some key industrial sectors in China

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Abstract

Anthropogenic activities including living and producing activities have posed increasing pressures on our living habitat. Demand for natural resources has been soaring to maintain our rapid development.

During industrial production process, the adoption of Best Available Techniques (BAT) can lessen impact on environment, therefore making substantial contributions to sustainable development. Furthermore, water saving and emissions reduction potential was chosen as the representative environmental potential indicator to conduct this research.

Purpose/ Research Question:

The aim of our research is investigate:

- For some key industrial sectors, adopted rules to select their BAT
- Water saving and emissions reduction potential of specific BAT for corresponding sector
- Water saving and emissions reduction potential of Industrial symbiosis
- Scenario analysis of BAT, BAU, and some other candidate BAT scenario

Key Literature Reviews (About 3~5 papers):

To achieve sustainable development goal, industrial sectors are urged to lessen environmental impact and evolve with city in the manner of coupling development (*Trindade, Hinnig et al. 2017*). The relation between man and nature must be redefined (*Montagnino 2018*).

The concept of BAT is defined by European Commission :

"Technique" includes both the production "technology used and the way in which the installation is designed, built, maintained, operated and decommissioned.

"Availability" means the technique considered is "developed on a scale which allows an implementation in the industrial sector, under economically and technically viable conditions".

"Best" means that the technique considered is the "most effective for achieving a high general level of protection of the environment as a whole" (*European Commission, 2010*).

Therefore testing how effective or the environmental protection potential of specific BAT is necessary and meaningful. In our research, water saving and emissions reduction potential was selected as the representative environmental potential indicator. It is well known that the water saving potential in the industry section is highly different for the various sub-sectors (*Ecologic Institute, 2007*). Therefore it is necessary to investigate what specific approach each sector applies when screening BAT. Meanwhile comparison of water saving and emissions reduction potential of BAT among different industrial sectors is rather valuable. Additionally a technique is not limited to a device but also includes management approaches such as environmental management systems (*Evrard, Laforest et al. 2016*). Therefore, the significance of industrial symbiosis saving water and reducing emissions should also be studied. In practice new kinds of governance structures is needed for specific collaborations (*Dougherty 2017*)

Design/ Methodology/ Approach:

- Establishment of conceptual framework

Based on literatures, conceptual framework of how to screen BAT from candidate BAT pool will be established.

- Data collection

Questionnaires were distributed to specialists and qualified technicians from each industrial sector to collect data in terms of water use and emissions of technique being adopted, candidate BAT and water saving and emissions reduction potential.

- Water saving and emissions reduction potential analysis
- Scenario analysis

Scenario analysis of BAT, BAU, industrial symbiosis and some other candidate BAT scenario

(Expected) Findings/Results:

- Conceptual framework

Establishment of BAT screening mechanism which is more suitable for various industrial sectors in China due to its unique character. Meanwhile it should be able to help seek for managerial BAT on the macro level, for example, the possible existence of industrial symbiosis.

- Water saving and emissions reduction potential analysis

Water saving and emissions reduction of BAT can be estimated based on literature and specialists' advice. Further environmental potential of BAT was conducted.

- Scenario analysis

Various scenarios can be set, for example, BAU, different combinations of candidate BAT, BAT, symbiosis scenario.

Scenario analysis can draw a clear map of where the different develop strategies may lead us.

Research limitations/ Implications:

- Limitations:

Data accessibility and data accuracy

We decided to research on a rather wide range of industrial sub-sectors, due to time limit, this research is only limited to a province, further work will consider broader boundary.

- Implications:

Emphasize the importance of BAT application in environmental protection

Investigate the environmental potential of BAT application

Support environmental management regulation by quantitative analysis

Promote industrial symbiosis for sub-sectors to achieve better environmental potential

Keywords: Best Available Techniques (BAT), industrial symbiosis, water saving and emissions reduction potential

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The components and operative mechanism of entrepreneurial ecosystem dominated by core firm:Evidences from characteristic town in China

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Entrepreneurial ecosystem research is being highly valued by academia and government, but due to the lack of in-depth study of typology, the theoretical construction progress is slow. This paper first studies the composition of the core enterprise-oriented entrepreneurial ecosystem and how the core enterprise plays a leading role in the development of the entrepreneurial ecosystem. Because the domestic governments at all levels pay too much attention to the construction of entrepreneurial platform, and scholars do not pay enough attention to the internal operating mechanism of entrepreneurial ecosystem, the research on operational mechanism is still at the exploratory stage. This paper constructs a systematic model of the operation mechanism of the core enterprise-oriented entrepreneurial ecosystem by using the method of single-case exploratory research and taking Yunqi Town in Hangzhou as the case study object. It deepens the research on the operation mechanism and operation theory of the core enterprise-oriented entrepreneurial ecosystem. At the same time, Yunqi town, as one of the typical representatives of the characteristic town, is the product of the development of new urbanization, and the study on it is the revelation of the internal mechanism of realizing the important measures of economic transformation and upgrading and regional sustainable development. It can provide practical experience for the development of other characteristic towns in China. It is found that: (1) the core enterprise-oriented entrepreneurial ecosystem is an organic whole composed of the core enterprise and several entrepreneurial subjects and their entrepreneurial environment, and the core enterprise is in the position of "structural hole", making use of its own advantages; In different stages and other entrepreneurial subjects to conduct complex leading interaction, committed to improving the level of entrepreneurship. (2) This paper analyzes how the core enterprises play a leading role in the operation of the ecosystem from the different stages of the core enterprise-oriented entrepreneurial ecosystem. In the platform building stage, the core enterprises use the entrepreneurial support mechanism, relying on their hands of technology, services and other advantages, play a leading role in resource leadership and platform building. To help start-up enterprises in terms of technology, service, planning, system, and so on, to empower the start-up enterprises. In the stage of development and operation, the core enterprise is the main body of the system in the position of "structural hole" and has strong information control ability, so it uses the mechanism of resource commitment, the mechanism of whole chain incubation and the mechanism of network nesting. To provide resources for the different needs of entrepreneurs at different stages, and to cooperate with other entrepreneurial service enterprises to solve different problems for entrepreneurial enterprises. In the phase of collaborative acquisition, the core enterprises use the enterprise collaborative mechanism, supplemented by the resource sharing mechanism to achieve the purpose of self-organization and self-gain, and make the ecosystem from disorder to order. The emergence of various main bodies of the system and the continuous derivation of different functional subsystems promote the self-organizing development of the system and the formation of unique competitive advantages in the regional industry.

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A Study on the Improvement of Operational Efficiency of Public R&D Management Agencies in South Korea

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Abstract

Public R&D management agencies have been taking on key roles in the national R&D ecosystem. The purpose of this study is to suggest ways to improve the operational efficiency of public R&D management agencies based on an analysis of their current status.

We approached this study from a life-cycle perspective as it applies to plan–management–evaluation of R&D. Data collection sources included documents, as well as surveys and interviews with staff members in the agencies responsible for national R&D management. Based on the results of the analysis, we present suggestions for improvement in three areas: (a) unification of R&D planning and evaluation of individual ministries; (b) establishment of a pan-ministerial management system for public R&D management agencies; (c) improvement and development of public R&D agencies' expertise and management services.

Finally, we discuss possible improvements and the limits of this study.

Purpose/ Research Question: As we face the fourth industrial revolution, there has been a growing awareness of the function and role of public R&D management agencies (hereinafter R&D management agencies) as the foundation for innovative growth and R&D efficiency. R&D management agencies is no exaggeration to say that the role of these institutions is directly related to the efficiency of government R&D, since these entities are implementing government R&D budgets at on-site R&D facilities.

However, there have also been concerns about a decline in the efficiency of government R&D due to the large number of R&D management agencies operating; some critics point out problems such as similar and overlapping R&D planning, insufficient ties between research results, and hindrances to researchers arising from disparate regulations, procedures, and systems of the various agencies. Thus, the Moon Jae-in administration has been pushing for operational efficiency of R&D management agencies so as to overhaul the agencies and improve the ability of researchers to work efficiently.

The purpose of this study is to suggest various ways for supporting operational efficiency of R&D management agencies based on analysis of the current status of these agencies.

Key Literature Reviews: This study is not theoretical study with hypothesis testing but survey research with exploratory testing for the policy implication on improvement of operational efficiency of R&D management agencies. First, using the major Literature Reviews, we tried to establish that the R&D management agencies has meaning of a ministry-affiliated middle-ranking institution that connects government ministries and R&D management agencies through analysis of the mechanisms for managing and adjusting national R&D programs under the NIS. In addition, procedures for bringing about coordination and consensus between the interested parties are essential for successful policy-making decisions. In this case, we examined the process in which R&D management agencies are intervened as an element in the NIS at the meso-level of project managers and evaluators through advanced research. Second, through the R&D management agencies overview, the reasons and roles of R&D management agencies, the foundation of the organization and its status, experiences in reorganization, and the status of budget and planning and evaluation costs were examined.

Design/ Methodology/ Approach: Field survey was conducted in this study. The operational efficiency of R&D management agencies with a life-cycle perspective of PLAN-DO-SEE was analyzed and the improvement of plan was suggested.

So a survey and unstandardized interviews 117 people from 17 R&D management agencies were carried out. One-sample t-test was carried out to prove statistical validity of the measurement result.

(Expected) Findings/Results: The results from the analysis of the survey showed that an analysis of the current status of R&D management agencies finds that they should be restructured into organizations of appropriate numbers as related to their governance systems, however legal and systematic of the government support turns out to be positive. In addition, there is a need for functional cooperation among these agencies in terms of strategy and planning, the sufficiency of research management personnel in terms of management and support, and the development and operation of a shared system of achievement among related organizations in terms of evaluation and utilization. Additionally, regulations and guidelines should be standardized with respect to the current PMS status, and that PMS is needed to integrate and overhaul systems.

Additionally in this study, various plans of improvement are suggested. First, based on the analysis results, we offer suggestions in three areas for improvement: (a) unification of R&D planning and evaluation of individual ministries; (b) establishment of a pan-ministerial management system for public R&D management agencies; (c) improvement and development of public R&D agencies' expertise and management services.

Research limitations/ Implications: In this research, the above analysis was also measured as individual performance recognition at the R&D management agencies rather than simply depending on quantitative data regarding performance because standardized classification of such performance has not been yet made in connection with the future direction of this study. This study shall be supplemented by a detailed plan for investigation. We think that if studies such as an analysis of efficiency or another analysis of performance are done in the next three to five years, better methods of improvement for the operational efficiency of R&D management agencies can be presented.

Keywords: National Innovation System, Public R&D Management Agency, Life-cycle Perspective, R&D Performance

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Efficiency Analysis of R&D Investment for SMEs
by Ministries of Korea

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Abstract

The Korean government has been steadily promoting SMEs' technological innovation support for SMEs' sales growth and job creation, making the growth of SMEs the driving force of national growth. In particular, the R & D support project for SMEs' technological innovation is a large part of SME support, and various supports are being provided by various ministries of government. However, the efficiency of R & D projects has not been studied much. In particular, there has been little evaluation of the efficiency of SME support by each ministry. Therefore, this study analyzed the efficiency of R & D investment for SMEs by ministries of government and by SMEs using DEA model. To do this, we used the information provided by the K2Base (National R & D Information Integration Support Service) operated by the Korea Institute of Science & Technology Evaluation and Planning. In addition, DEA analysis of each ministry of government revealed potential improvable values of inefficient institutions, and the relative efficiency was verified by considering the characteristics of each institution based on the efficiency results of SMEs. In this way, we have verified that national R & D investment is effective in the growth of SMEs. We will improve the efficiency of national research and development investment to support SMEs in the future and establish the basis for policy decision making for mid-to-long term plan.

Purpose/ Research Question: The purpose of this study is to analyze the efficiency of R & D investment for SMEs by ministries of government and by SMEs using DEA models. To achieve this, we used the information provided by the K2Base (National R & D Information Integration Support Service) operated by the Korea Institute of Science & Technology Evaluation and Planning. In addition, DEA analysis of each ministry of government revealed potential improvable values of inefficient institutions, and the relative efficiency was verified by considering the characteristics of each institution based on the efficiency results of SMEs. In this way, we have verified that national R & D investment is effective in the growth of SMEs.

Key Literature Reviews: It is important to look at how the effectiveness and productivity of policies are improved by research on national R & D support and investment performance analysis (Busom, 2000). There are not many studies analyzing the efficiency of national R & D projects or tasks. Hsu & Hsue (2009) found that small firms are more efficient than firms that perform government R & D tasks in Taiwan using DEA and Tobit analysis. In a previous study on national R & D support and investment performance analysis, Lach (2002) analyzed the effects of national R & D investment on Israeli manufacturing companies from 1990 to 1995 by analyzing the productivity effects of government R & D support. As a result, the government's R & D investment has a positive effect on promoting R & D investment of SMEs, but it has a negative effect on large enterprises. In the study of Choi (2018),

we analyzed the effect of government R & D support on innovation performance of SMEs. The government's R & D subsidy, human resource support, and technical support are classified according to the characteristics of the company. As a result, the effectiveness of government R & D support varies depending on the type of product innovation and the characteristics of the company that SMEs pursue. Oh and Kim (2018) presented their research on the achievements and direction of SME R & D support. During the period from 2012 to 2016, we analyzed 12 SME support projects and support performance through 12 ministries. In terms of economic and social innovation, we measured sales, asset growth, number of employees, own R & D investment Using various performance indicators. As a result, research on productivity and effectiveness has been conducted rather than verification of efficiency of SMEs in most countries. In addition, there are many analyzes on the effect of government R & D subsidy and productivity, but there is not much analysis on the efficiency of government R & D subsidy. Also, R & D tasks of government R & D total 19 trillion won There is no analysis. In addition, it differs from other researches in that R & D support and real financial information of SMEs are matched and utilized as growth potential and indicators of SMEs.

Design/ Methodology/ Approach: In this study, we measured the relative efficiency of national R & D projects for SMEs by using DEA method. In addition, descriptive statistics and mean comparison analysis (difference analysis) after relative efficiency analysis were analyzed using IBM SPSS Statistics 22.0

(Expected) Findings/Results: The relative efficiency analysis of the national R & D support by the ministries was calculated by the CCR model and the BCC model. The efficiency of the scale was evaluated by comparing DMU7 and DMU8. Respectively. There is no inefficient decision-making unit due to pure technical efficiency. Conversely, most decision-making units are inefficient in scale. It is interpreted that the cause of inefficiency is not due to pure technological efficiency, but rather to the inefficiency in scale. In other words, when the ministry performing national R & D considers economies of scale within the budget range that can be practically used, it can be interpreted that it operates relatively efficiently. However, the growth of SMEs appears to be somewhat lower than that of other ministries that operate optimally in terms of efficiency, even though the input volume is similar to the unchanged scale. Therefore, when the budget for R & D support and the number of tasks are included in the input variables, the inefficiency in the CCR model can be eliminated by improving the total assets of SMEs, capital increase, and operating profit increase.

Research limitations/ Implications: Due to the nature of the efficiency analysis, the results of the analysis vary greatly depending on the choice of decision making units, input variables, and output variables.

Keywords: DEA, R&D Investment, SME(Small to Medium-sized Enterprise), Efficiency, K2Base

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The Effect of Personal Value on CSV(Creating Shared Value)

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Abstract

Purpose

This study examines the personal attitude and value for configuration of CSV(Creating Shared Value).

Intro(background)

Recently, the paradigm of development is changed.

Development pursues individual and social well-being through harmony between economic growth, social integration, and environmental protection. **Many researchers and practitioners are paying attention to innovative activities and services that are motivated by the goal of meeting a social need**(2018, Hyunjung Lim, Jonghwan Eun).

For the past several years, they seem to have increasingly discussed CSV(2018, Rebecca Chunghee Kim). **CSV consists of business, social, and personal values[Fig 1]**. CSV represents a new approach to managing that cuts across disciplines. Because of the traditional divide between economic concerns and social ones, people in the public and private sectors have often followed

very different educational and career paths(2011, Michael E. Porter & Mark R. Kramer). Education should consider not only the economic impact of business activities, but also the social impact.(2018, Daesu Kim, Dongshik Lee). Knowledge have to provide policy direction and idea about how to identify and unravel various common issues we face(2018, Keunyoung Lee, Kwangho Jung). But, many schools still teach the narrow view of economic value. **School curricula will need to broaden in aspect of social and personal value.** It is an important task to build the right social and personal value of the CSV through education in school(2012, Michael Driver).

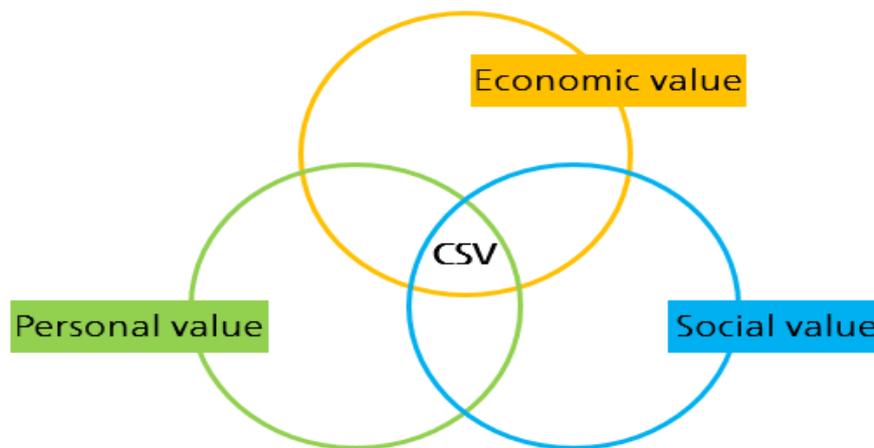


Fig 1. configuration of CSV

Intro(background)

This study focused on the importance of building personal value[Fig 2].

- ① An Area of personal value; **Self actualization**
- ② A combination area of personal value and economic value; **Goal setting**
- ③ A combination area of personal value and social value; **Solidarity**

Research Question

- Does Self Activation have a positive effect on CSV?
- Does Goal Setting have a positive effect on CSV?
- Does Solidarity have a positive effect on CSV?

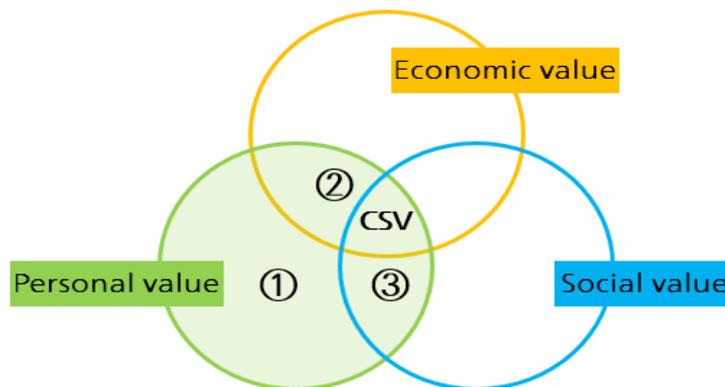


Fig 2. An area of personal value

Key Literature Reviews

The concept of CSV

-CSV is a business concept first introduced in Harvard Business Review article Strategy & Society: The Link between Competitive Advantage and Corporate Social Responsibility (2002, Michael E. Porter & Mark R. Kramer).

-The concept of shared value can be defined as policies and operating practices that enhance the competitiveness of a company while simultaneously advancing the economic and social conditions in the communities in which it operates. Shared value creation focuses on identifying and expanding the connections between societal and economic progress(2011, Michael E. Porter & Mark R. Kramer).

-CSV means the transformation of the idea that a company will actively solve social problems through innovation and expand the total amount of economic and social value. In other words, it is a method of raising pies that companies and society can share rather than having more pies (Michael E. Porter & Mark R. Kramer, 2006, 2011).

-CSV can be seen as a paradigm of advanced capitalism and a management strategy in which members of capitalism work together to solve social and economic problems at the same time(2014, Jong-youn Rha, et al.).

Table 1. List of literature review for CSV

The competitive advantage of corporate philanthropy	2002, Michael E. Porter and Mark R. Kramer
Strategy and society; The Link between competitive advantage and corporate social responsibility	2006, Michael E. Porter and Mark R. Kramer
Creating shared value	2011, Michael E. Porter and Mark R. Kramer
An interview with Michael Porter: Social entrepreneurship and the transformation of capitalism	2012, Michael Driver
Suggestions for Future Research in an Era of Creating Shared Value	2014, Jong-youn Rha, Hakkyun Kim, Hackjin Kim, Yuri Lee, Jin-Myong Lee

Definition of Variable

-Dependent variable

Social Commitment: Set the proxy of the CSV as a social commitment based on a large number of literature reviews. Social commitment consists of social engagement and ethics. People develop social commitments or ties to other people with whom they interact as well as to the small groups, organizations, and communities that constitute the larger context for their social interactions (Edward J. Lawler, Shane R. Thye, Jeongkoo Yoon,). Through CSV, each member seeks common value that can be shared together based on cooperative relationship as an element of society (2016, Joanna Kurowska-Pysz). The main factors for goal consciousness can be defined as social engagement and ethics (2016, Marian Buil, et al.).

Table 2. List of literature review for dependent variable

Social Commitments in a Depersonalized World	2009, Edward J. Lawler, Shane R. Thye, Jeongkoo Yoon
An explanatory study of MBA students with regards to sustainability and ethics commitment	2016, Marian Buil , Juan Pedro Aznar , Jorge Galiana, and Alba Rocafort-Marco
Opportunities for Cross-Border Entrepreneurship Development in a Cluster Model Exemplified by the Polish--Czech Border Region	2016, Joanna Kurowska-Pysz

-Independent variable

①**Self Actualization;** Self actualization is the area of personal value. Self Actualization consists of self-consciousness, self-confidence, creativity, and challenge. Maslow(1962) has developed the idea of the self-actualization(2007, Saul McLeod). As each person is unique the motivation for self-actualization leads people in different directions (Kenrick et al., 2010). Self-awareness influences decisions about learning and participation(2005, Winslow Burleson).

Table 3. List of literature review for independent variable

Maslow's Hierarchy of Needs	2007, Saul McLeod
Developing creativity, motivation, and self-actualization with learning systems	2005, Winslow Burleson

Definition of Variable

-Independent variable

②**Goal Setting;** Goal setting is the combination area of personal value and economic value. Goal Setting consists of common objectives, participation, planning, leadership, and tolerance. Goal Setting is based on what Aristotle called final causality, that is, action caused by a purpose(1996, Locke, E. A). Results from a review of laboratory and field studies on the effects of goal setting on performance show that in 90% of the studies, specific and challenging goals led to higher performance than easy goals, "do your best" goals, or no goals.

Goals affect performance by directing attention, mobilizing effort, increasing persistence, and motivating strategy development(1981, Locke, E. A., et al.). To participate in choosing their own goals have direct influence on their performance(1997, DT Griffiee, SA Templin).

Table 4. List of literature review for independent variable②

Motivation through conscious goal setting	1996, Edwin A. Locke
Goal setting and task performance: 1969–1980	1981, Edwin A. Locke

③**Solidarity**; Solidarity is the combination area of personal value and social value. Solidarity consists of relationship, cooperation, and communication. The term "solidarity" has its roots in the Roman law of obligations. "Solidarity" is now comprehended as a mutual attachment between individuals, encompassing two levels: a factual level of actual common ground between the individuals and a normative level of mutual obligations to aid each other, as and when should be necessary(1999, K. Bayertz).

For sociologists concerned with social capital and civic community, the most important benefit of generalized exchange may be its presumed enhancement of social solidarity, including bonds of trust and affective regard(Linda D. Molm, Jessica L. Coll,David R. Schaefer, 2007).

Table 5. List of literature review for independent variable③

Four Uses of "Solidarity"	1999, KURT BA YERTZ
Building Solidarity through Generalized Exchange: A Theory of Reciprocity1	2007, Linda D. Molm, Jessica L. Coll, David R. Schaefer

Hypothesis

-H1 ; Self Actualization will have a positive effect on CSV.

-H2 ; Goal Setting will have a positive effect on CSV.

-H3 ; Solidarity will have a positive effect on CSV.

Design

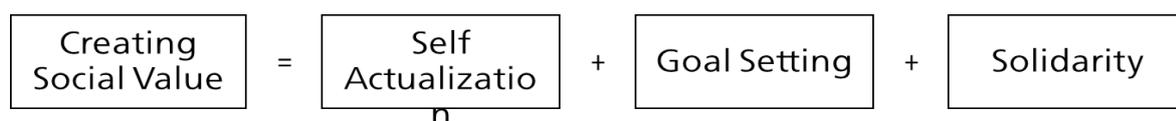


Fig 3. Study model

Approach

Sample selection and survey for students of Kumoh National Institute of Technology, Republic of Korea

Research limitations/ Implications:

There is a limitation that couldn't validating factors through implementation.

Keywords: CSV, Social innovation, Social commitment, Personal value

(Expected) Findings/Results:

We will develop practice programs and implement that take into account the positive impact of variables.

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Public Service Design Strategy based on Open Innovation Platform

- Focusing on the Citizen-sympathetic Bus Stop Development Project of Jeju Special Self-Governing Province -

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Abstract

Recently, public awareness of the importance and necessity of citizen participation and a user-centered policy design has been increasing. However, the way of gathering the opinions of the people in the policy process is limited mainly by one-off events such as meetings, hearings and discussions, or by specialists without the beneficiaries. Accordingly, the use of 'design' as an approach for a user-centered national policy and public service planning has become increasingly important in developed countries and emerging economies. Because 'design' based on a creative and human-centered approach has the potential to find problems in the context of people's everyday lives and to visualize solutions to problems through ways of participation, collaboration and co-creation, and so on.

This study will analyze the activities of 'National Design Team', a new policy design method that has been implemented since 2014 by the Ministry of Public Administration and Security and the Ministry of Industry and Commerce of Korea. In this process, we will analyze how public service design strategy based on open innovation platform engages the public in the process of policy design and actively introduces the true needs of the people into policy design. As a research method, first, this study will examine the purpose and the contents of the National Design Team which has been conducted since 2014 through previous research literatures. Second, as a major example of the research, the process and results of the 'Citizen-sympathetic Bus Stop Development Project', conducted by the National Design Team of Jeju Special Self-Governing Province in 2018 will be analyzed in depth. Through this, this paper will review the role and value of design that contributes to the development of public policies and services that people are satisfied with. Furthermore, it is expected that the design can contribute to the realization of a people-centered policy by acting as the planner and designer of the policy beyond the role of creating and shaping the existing environmental facilities in the public sector.

Purpose and Research Questions

The purpose of this study is to explore the roles and effectiveness of service design strategy based on open innovation platform in contributing to a people-centered public policy design. The main subject of the study is the 'Citizen-sympathetic Bus Stop Development Project' conducted by the National Design Team of Jeju Special Self-Governing Province. The research questions of the study are as follows.

- *Research Question.1 : What is the background and role of the National Design Team?*
- *Research Question.2 : What is the purpose of the Citizen-sympathetic Bus Stop Development Project?*
- *Research Question.3 : What is the progress of the Citizen-sympathetic Bus Stop Development Project?*
- *Research Question.4 : What are the results of the Citizen-sympathetic Bus Stop Development Project in designing the people-centered public policy?*

Key Literature Reviews

- *Understanding of the National Design Team*

The National Design Team is a new policy design methodology that has been implemented since 2014 for the central government and the local governments under the leadership of the Ministry of Public Administration and Security and the Ministry of Industry and Commerce of Korea. The purpose of this team is to establish a new development methodology that actively engages the people in the whole process of policy development. In the meantime, the will of the Korean government to engage the people in the process of policy development has been steadily. However, most of the existing methods were only collecting opinions expressed expressively in the form of words and writings. In particular, it has the disadvantage of not being able to reveal the hidden context and needs in the process of interacting with the public. For this reason, the National Design Team, the first attempt to consider design approach as a methodology for a people-centered policy planning, was promoted. This National Design Team establishes 'National Design Task' and works on solving this through service design methodology. This 'National Design Challenge' refers to the national participation type projects that reflect the demand of the people with high interest of the people. National Design Team develops these tasks as policies and public services by applying service design methodology. As a 'National Participatory Policy Design Model', the National Design Team started with 31 tasks in 2014, and by December 2017, more than 10,000 civil servants, service designers, and policy-makers have been participating in approximately 900 projects and developing into a national project in which people participate and design 'various public policies and services'. The National Design Team forms a group centering on each central and local government in accordance with the time of surveying the demand during February and March every year. Each local government has various ways of participating, such as publicly recruiting team members online. Compared with the existing policy planning process, which was conducted mainly by experts in policy planning such as civil servants, policy studies, and public administration, the activities of the National Design Team are looking for a big change in a convergent approach. The general operation method of the National Design Team is as follows (Figure 1).

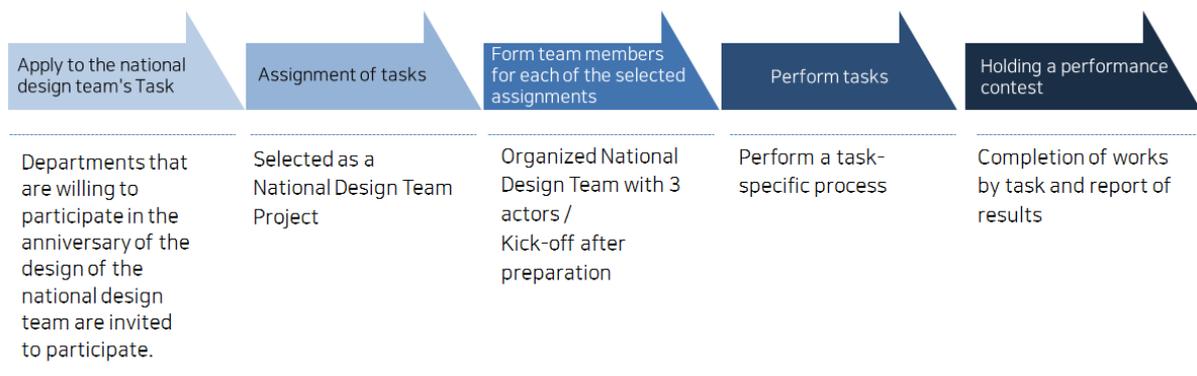


Figure 1. The general operation method of the National Design Team

• *Background of the Citizen-sympathetic Bus Stop Development Project*

The project, ‘*Citizen-sympathetic Bus Stop Development*’, is a public service design project proposed by the National Design Team in Jeju Special Self-Governing Province in 2018. According to a report by the Ministry of Land, Transport and Tourism(2018.2.9), Jeju Island has been ranked as the top city (5.16)in Korea as a result of user satisfaction survey of public transportation since 2015. As a result(2017.8.26) of the analysis of big data according to the reorganization of public transportation system in Jeju Island, Jeju Island's daily average number of users of public transportation increased by 12.2% compared to last year, from 146,000 to 165,000. However, despite the high level of satisfaction with public transportation, in Jeju, the rate of civil petition complaints increased significantly compared to other provincial policies due to the initial disruption of the implementation of the public transportation system. Above all, there are frequent cases where the bus timetable is not marked at a bus stop or a bus passes without stopping. For this reason, there was a need for continuous efforts to resolve this problem. Under this background, the project the ‘*Citizen-sympathetic Bus Stop Development Project*’ was first implemented to improve the satisfaction of users by focusing on improving the users' inconvenience such as the unkindness of the bus drivers. Secondly, it was promoted for the purpose of deriving measures to improve bus ride environment more than fundamentally improvement demand of residents due to frequent breakdown of existing stopping point. Specifically, this National Design Team's objective is to improve about 1,552 circular bus stops installed at places where shelter-type bus stops and BTS systems are not able to be installed due to space constraints to user-oriented bus stops that enhance user satisfaction (Figure 2).



Figure 2. General bus stops on Jeju Special Self-Governing Province

Findings

In conclusion, the public service design strategy of the National Design Team is the first attempt to introduce design into a public policy that was designed by public experts in the past, it has an important meaning. It can be mentioned that the redesigned tasks from the perspective of the people through the national design group activities presented a model that realized the policies of ‘the people directly’ and ‘the people led’ in the ‘people's perspective’.

Keywords: Service Design, Open Innovation Platform, The National Design Team, Citizen-sympathetic, People-centered policy

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Is Korea building a sustainable innovation system?

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Abstract

Purpose/ Research Question:

What are the characteristics of Korean government R&D investment compared to public R&D in other OECD countries? Can Korea's public R&D investment Sustainable development through the establishment of a national innovation system (NIS)?

In Korea, public R&D is being criticized as having poor quality and inefficient operation. Is this a reasonable criticism? What are the various inefficiencies and what are their solutions?

The "national innovation system" theory emphasizes linkage the most. If so, did Korean R&D establish a cooperative network?

Key Literature Reviews

Science, technology and innovation (STI) are an important part of sustainable development. UNESCO recommends that countries take advantage of STI by building a strong and innovative system that fits their country's situation and implementing appropriate policies. Governments can develop strategic and coherent STI policies that are consistent with policy in other sectors, such as education, industry, and social structure. This policy and public investment should be used to build and develop robust science-policy-social infrastructure. In order to expand the share of the medium and high-tech industries that generate sustainable and high added value, scientific knowledge stocks must be accumulated sufficiently, and the creation of scientific knowledge can only be attained by continuously investing research and development costs and fostering excellent researchers .

That is why many countries are investing in R&D for innovative and sustainable economic-social development. Among them, Korea has been intensively investing in research and development, and has become the world's largest R&D investment relative to GDP and the world's fifth largest investment. The investment ratio is 22.5% for public investment, 76.2% for private investment, and

the other is foreign investment. Despite the active investment, however, the accumulation of investment and scientific knowledge is not enough because the size of the country is small and the industrial development is late compared with neighboring countries such as China, Japan and the United States. (OECD Economic report, UNESCO STI, Worldbank)

According to a study by OECD, the concept of National Innovation System rests on the premise that understanding the linkages amongst the actors involve in the innovation process is key to improving technology performance. The innovation performance of a country depends to a large extent on how these actors relate to each other as elements of collective system of knowledge creation and use, as well as technologies they use.

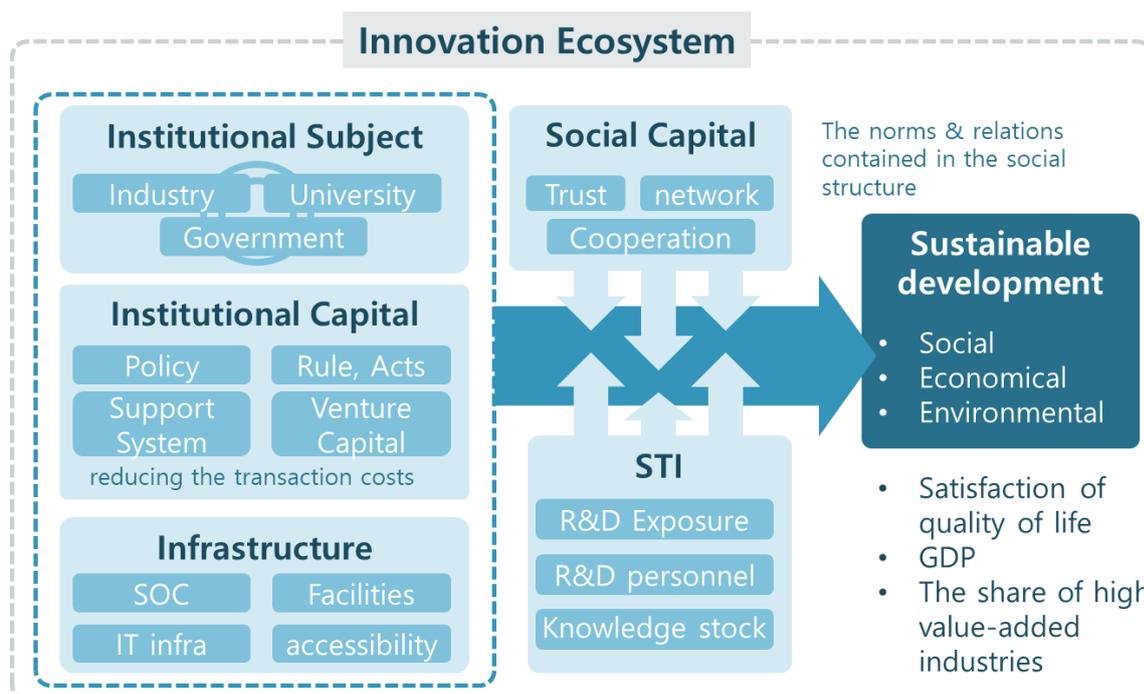
National policies and systems support and coordinate technological innovation and information exchange. Institutions can form and develop a network structure that absorbs and disseminates new information and technology through interactions among innovators such as businesses, universities and research institutes. The innovation policy that the state develops the industry and accelerates the economic growth is related to the learning and diffusion of the new technology through the nurturing of professional talents and network creation.

Most of the previous researches have simply set the Input and Output settings to Number of Patents and Scientific Paper, which is the R & D investment and scientific output. Therefore, qualitative aspects and socio-economic contributions were ignored. In this study, we added the network and social capital among the entities that can be seen as the result of the NIS construction to the input barrier and further analyzed the economic growth and social development indicators on the output.

Social capital means network, trust, and linkage, not 'capital' itself. It is called capital because it plays a vital role in ensuring that innovations can take place and have a profound impact on industry and state systems as capital. In recent 20 years, the term social capital has been widely discussed but has not reached a consensus on concepts, functions, applications, and roles. In this study, we want to conduct a literature survey on the role of social capital in the national innovation system and to improve the research model.

In recent years, it has become common to analyze social network services through the development of technology, and it is also possible to analyze networks and cooperation through proxy indicators such as collaborative research or patent application for joint application. Korea is better able to research public R & D information and research information than data from other countries.

Design/ Methodology/ Approach



	Classification	Variables	source
input	STI	<ul style="list-style-type: none"> Public R&D investment Private R&D investment R&D researcher labor cost (ISIC 4.0) 	OECD STAT
	Social capital	<ul style="list-style-type: none"> Public collaboration ratio Cooperation ratio International cooperation ratio Number of collaborative research 	OECD STAT
	Industrial Infrastructure (Supply / Demand)	<ul style="list-style-type: none"> Domestic supply and output (ISIC 4.0) Exports 	OECD STAT
	Institutional capital	<ul style="list-style-type: none"> Intellectual property protection level Funding (Venture Capital) Education and Labor Force Indicators 	World Bank
Output	Scientific Achievement	<ul style="list-style-type: none"> Number of papers Number of Top 10% researchers Number of joint patents 	Scopus, Clarivate Analytics
	Technical Achievement	<ul style="list-style-type: none"> Number of PCT applications International patent registration number 	Wipson
	Economic performance	<ul style="list-style-type: none"> GDP Percentage of high value-added industries 	OECD STAT
	Social indicator	<ul style="list-style-type: none"> Satisfaction of quality of life . 	OECD STAT

(Expected) Findings/Results

Europe (UK, Germany, and France), East Asia (Korea, China, and Japan) and North America (USA, Canada) groups are investing in distinctive R&D. R&D in European countries is more focused on autonomous 'knowledge creation' itself, while East Asia is focused on 'industry upbringing' under state leadership. In Europe, universities account for 60% of researchers and generate scientific information. In East Asia, the proportion of researchers is as low as 10%, and it serves as the educational institution where the young people before the job are the majority. Its role as an incubator is stronger.

Korean R&D is not inefficient. However, the actual amount invested in Research is small and there is investment imbalance. The number of patents, the number of patent applications and the number of registrations compared to the investment amount do not lag behind other countries. In particular, considering the amount of R&D expenditure and manpower injected into universities, the number of papers is never low. About 50% of public R&D in Korea is directly or indirectly invested in industrial development. The proportion of infrastructure investment is large. Many investments are being made in the construction of research complexes and facilities. A lot of money is being put into building IT infrastructure such as computer system construction and information construction.

Simple calculation of the investment amount per researcher is sufficient, but the amount invested in actual research and experiment is relatively low because the proportion of physical infrastructure investment is large. Investment in some sectors is heavily concentrated. It is hard to see it as a stable research environment because of its large and constant volatility.

Knowledge exchanges and cooperation in Korean R&D are at a low level. Private R&D, which accounts for 3/4, is largely self-funded and closed. In Korea, when universities and companies worked together, efficiency was lower than other collaborative research. In North America, universal industry-university cooperation culture is not applied in Korea.

Research limitations/ Implications

Public R&D in Korea focuses on industrial support and technology development rather than NIS construction for continuous development. Since the ratio of collaborative research by various subjects is low, it does not form a network or actively exchange information. Rather than focusing on short-term economic growth, we need a policy to pursue long-term development by building a self-developed innovation system

Keywords: National Innovation system (NIS), Social capital, innovation capacity, frontier analysis

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The impact of open innovation on patent registration

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Abstract

Purpose/ Research Question:

As the cost of patent registration and maintenance increases rapidly, companies are making efforts to 'patent efficiency' in order to save the cost as much as possible. Rather than holding a lot of patents unconditionally, it is necessary to have a strategy of 'choosing and concentrating' to protect the core patents.

In this paper, we study the effect of open innovation on the cost of patent registration for the automobile and pharmaceutical sector in order to select and concentrate patents.

Key Literature Reviews (About 3~5 papers):

Jeong Hee Lee(2016), et al. suggest ways to predict the appropriate royalty rate and prepayment. Considering the characteristics of licensor on patent characteristics, licensee characteristics and characteristics. We pointed out that the nature of patents is important primarily in terms of technology deals and contract fees for groups, followed by the characteristics of the licensee.

Kim, Hyun-Joo(2016), et al. Investigate the strategic alliance portfolio and characteristics of key partners in the environmentally friendly automobile market, and use Toyota's patent information to present important management implications and suggestions to corporate managers and policy makers.

Jinhyo Joseph Yun(2015), The study included 144,625 patents submitted to the Patent Office from 1981 to 2010. Limited to cross-patent applications that are the goal of open innovation. Further research should be conducted on various open innovation channels such as patent citations, intellectual property rights transfer, licensing and M & A.

Jianping Liu(2018) et al. Investigated whether the impact of international R & D on innovation efficiency of specific R & D outcomes used national level panel data for 44 countries during 1996-2013. By observing US patents and domestic patents separately, we enhance the angle of

measurement of international R & D spillover effects.

Design/ Methodology/ Approach:

This paper is carried out according to the following procedure.

1. The open innovation index IOI and ROI proposed by the author are derived from Korea's automobile, aerospace, robotics and pharmaceutical patents (recent 10-year registered patents).
2. Derive the average number of years of registration and registration in each industry sector.
3. Analyze the relationship between open innovation index and registration fees.
4. Obtain implications through analysis.

(Expected) Findings/Results:

The relationship between the index of innovation and the period of maintenance of registration in each industrial sector is clarified, and the efficiency for future registration is proposed.

Research limitations/ Implications:

The decision to maintain registration can vary depending on the social environment, business capabilities of the company, and policies. There is a limit to the decision to maintain registration because it is simply the relationship between open innovation and registration fees.

Keywords:

Open Innovation Analysis, Patent Analysis, Patent Registration Fee, Automobile Aerospace Robot and Pharmaceutical Patent

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Self-organizing Smart city 4.0 model based on urban evolution

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Abstract

Purpose/ Research Question

Today, more than 60% of the world population and more than 80% of the Korean population live in cities. Urbanization increases city-provided convenience and advantages, but also transportation, environment, crime problems simultaneously. Therefore, the purpose of the Smart City was to decrease the city's expenses by solving the problems and increasing the quality of life. However, with the city's platformation through the 4th industrial revolution technology, it is estimated that the advantages will overcome the expenses. Moreover, smart cities are self-organizing by transforming from the standard infrastructure-centric to data and citizen-centric. Presently, as city is the subject of creation not consumption, the smart city is the key industry of creating more than 60% of the GDP, in the value creation of smart cities as main actor of production viewpoint.

Key Literature Reviews (About 3~5 papers)

As the rapid technological developments such as platforms and AI combined with China and India's urban development demand from 2010, led to the rapid increase of Smart Cities and the appearance of its Evolution Model.

In 2013, IDC introduced the Smart City Maturity Model. Based on the elements of strategy, culture, process, technology and data, the five levels are Ad Hoc, Opportunistic, Repeatable, Managed, and the Optimized. As the city continues to evolve, it requires more time, resources and effort continuously. However, the smart cities of 2013, the growth of culture and process is slow, which IDS figures the maturity level as between the Opportunistic and Repeatable.

Cohen, studying smart cities from 2011, proposed a three-level process about how cities should accept technology and development, and how the government should lead its citizens [8]. The Technology Driven Smart City 1.0, where engineers provide solutions, understanding towards its effect on the citizens' quality of life was insufficient. In the Technology Enabled and City-Led Smart City 2.0, smart technologies and innovative placement as the future vision were led by the administrators, mainly focusing on technical solutions on improving quality of life. As of 2015, smart

cities are at 2.0 level. The Citizen Co-Creation level, or Smart City 3.0, aims to increase every citizen's quality of life by focusing on equity and social integration through optimizing lowly utilized resources and inducing citizen participation.

Hwang and Jang defined the smart city into 5 phases on structural viewpoint [4]. In Infrastructure phase, the city's innovation starts by constructing infrastructures. For Vertical Grid phase, individual works and services are linked or integrated vertically, which is the level of today's smart cities. Third is Horizontal Grid phase, where convergent intelligence takes place through connections provided by sharing data and platforms. Next is the City Platform phase, where the city serves as a platform, sharing data naturally like a living organism. The last is Future City, where the city transforms into an intelligent society, AI and robots replacing the city's traditional system and structure.

According to Deloitte, today's smart cities are evolving from infrastructure and technology-centric Smart City 1.0 to citizen participation based 2.0, or the City as a Platform, asserting the evolution into two. While 1.0 uses sensing and data analytics for efficient administration, 2.0 uses data, digitization and human-centric design for citizen experience and improvement in decision making, where smart citizens cooperate to solve problems and make significant decisions based on city data connected on 1.0 level.

Design/ Methodology/ Approach

The analysis on city's network effect as a single production actor was scarce on traditional development models. As reality is an open society, understanding the open system like the market economy, where energy inflows and outflows from outside, through complexity theory is necessary. Cities go through the self-organizing process of the complex adaptive system, like the brains. This research proposes the future model as the "Self-Organizing City," and suggests implementing to the Smart City Evolution model, based on the KCERN Platform formula: aspects of scale, connectivity, and entrepreneurship.

(Expected) Findings/Results

On Smart City 1.0 phase, as cities were not intelligent, cost-to value increase was not remarkable. Therefore, most policymakers sought decentralizing cities. As the benefit of offline cities increased by Sarnoff's law(N), city growth was limited to a particular scale, due to the rapid increase of cost compared to advantages.

However, as the 3rd industrial revolution provided wired internet, the value of Smart City 2.0 above certain level increased geometrically. Due to creativity, benefits increased by Metcalfe's law(N^2). Therefore, expenses decrease as more information is shared, and the city's size expands.

4th Industrial Revolution's O2O platform expanded the connection between material and information by Reed's law(2^n), where city's benefit increases by network effect. As benefit increases by innovation, the cost of wireless internet and IoT sharply decrease. Moreover, by the expansion of online-offline convergence, cities grow without limitation on its size, where the connection and

innovation decide the inclination of city's benefit-cost curve. As the city platform is responsible for connectivity, its value rapidly increases through the 4th industrial revolution's O2O platform.

Moreover, when city reflects its own on the Cloud as Digital Twin, and when complete information becomes accessible through citizen's smartphones(Edge), the Self-organization takes place, which is the ideal linkage between the city and citizens. Based on the connection, the AI concludes the best result and diverges throughout the real cities.

The realization of the proposed model requires three tasks in advance: 1) data the city to enhance connectivity, 2) build an open platform on the Cloud, 3) activate data mash-ups. For system implementation, the four-level phase of Smart Transformation is the logical structure. The levels are about virtualizing reality through digital transformation, optimizing big data on the virtual world through AI, realizing through analog transformation. KCERN proposed Datafication, Informatization, Intellectualization, and Smartification as four-level, which is identical with the human brain, on the perspective of structured model creation through the virtualization process and optimizing (smartifing) through predictions and customizations.

Research limitations/ Implications

Although the research proposes self-organization as the future vision of smart cities, continuous researches on validity is required. As smart cities are on the early levels of establishing 3.0 model, empirical analysis of the 4.0 model is not possible. However, the network effect infers the conclusion that cities will newly evolve into the 4.0 model by strengthening internal connectivity, establishing an open platform and fulfilling entrepreneurship based on diversity. The support on the self-organizing smart city through continuous research is required.

(1,049 words)

Keywords: Smart City 4.0 Model, Self-organizing Smart City, City Evolution Model

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Unified Model of Sharing Economy and National Strategy

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Abstract

Purpose/ Research Question:

Sharing Platform Economy is rising in the 4th industrial revolution age, and already 70% of the top 10 global enterprises transformed into platform enterprises. During the first and second industrial revolutions, offline possession was the paradigm. Therefore, establishing sharing economy was insignificant, mostly existing as communities or cooperatives. The development of the Internet through the 3rd industrial revolution started the online paradigm, and online platform-based sharing economy grew up to 5% of the world economy. Moreover, in the 4th industrial revolution era, it is estimated that the O2O sharing economy, the convergence of offline and online, will reach up to 50% of the world economy by 2025. Therefore, this research aims for in-depth research of the sharing economy and proposing the combined model for the sharing economy system.

Key Literature Reviews (About 3~5 papers):

As the sharing economy growth became visible, various definitions were born. Based on its perspective and shared objects, the name of the shared economy is in variety such as cooperatives, futures economy, shared economy, open-source, on-demand, platform business, geek economy and so on. Moreover, scholars like Elinor Ostrom, Carol Rose, Richard Matthew Stallman, Eric Raymond, and Lawrence Lessig defined sharing economy on their definitions. Ostrom explained sharing economy as "delicately designed institutional strategy where voluntary mutual observation

and mutual restrictions among union members and autonomic regulations provide efficacious management of shared resources"[2]. However, definitions on sharing economy until then did not reflect the facts that sharing is limited by the limitation of resources. In reality, sharing through cooperatives still have the cost burden of sharing, and sharing is limited by the marginal utility of shared values. Later, through the 3rd industrial revolution, the internet appears, the model where the Carol Roses (1986)'s the comedy of the commons is realized [3]. As the information sharing cost became almost zero through online platform, the Internet, open-sources and online platforms were vitalized. During this period, open-sources grew by sharing information on online. The concept of Copyleft, which is a measure of sharing information based on copyrights, was introduced by Richard Matthew Stallman in 1985. Later the Free Software movement emerged, emphasizing on the free usage, study, and modification of software. In 2002, Lawrence Lessig established Creative Commons, for encouraging free usage of copyrighted products while also distributing the CCL(Creative Commons License) to protect the rights of the copyright holders.

In 2006, Tom Eisenmann analyzed and explained the sharing economy platform as the Two-Sided Market, the market where business between the seller and buyer takes place, while giving the costs and expenses to both sides. The Eisenmann's platform research is the research which reached most closely to the platform-based sharing economy systems, like the Uber, KakaoTaxi, and others. While these characteristics explain why buyers and sellers can coexist on the sharing economy system, in order to reflect one's own needs, consumers who participate from the production level, or the "Prosumer" start to emerge.

However, the definitions on sharing economy by the precedent researches lack consistency, and it is limited in explaining the various aspects multi-dimensional attributes of the sharing economy in comprehensive. Therefore, further in-depth research on the combined model of sharing platform economy system is required.

Design/ Methodology/ Approach:

This research defines sharing economy as "an activity of accomplishing value creation and cost reduction through sharing economic elements and proposes the KCERN Sharing Economy Cube Model (2018), which categorized the sharing economy into information, material and relation while reflecting the economic purposes of profit and non-profit. The discussion on sharing economy takes different shapes, depending on which to share (object), who will share (subject), and its reasons (purpose), but the researching is proposing the comprehensive definition through 3*3*3 integrated cube model, which is the developed version of KCERN's sharing economy cube model of 2016 [4]. Moreover, the advantage of the KCERN model is that, as the model can adapt various definitions of sharing economy, the integrated model can explain the new form of sharing economy. Also, its significance is that the model reinterpreted the emergence of the platform and the transformation of shared objects that previous studies did not cover.

As the 1st and second industrial revolution was the material revolution on offline, where ownership economy was the majority and sharing economy taking hold of the rest. According to KCERN, as the online platform based on internet server vitalizes through the 3rd industrial revolution, the sharing of information became possible [6]. As Jeremy Rifkin mentioned, the virtual world by the internet revolution made the marginal cost of sharing to zero, which led to the adaptation of law of increasing marginal utility where the effect of sharing geometrical increases. As the offline cooperative's limitation on reality, which is the burden of sharing the cost, became marginally zero with the marginal utility of sharing values, sharing became the primary means of creating a wealth of entire society. Hence, the Internet promoted voluntary cooperation through making sharing costs to zero and networking the value sharing, while providing the trust of transparent and repeated business through the platform. In other words, the sharing economy in offline reality was limited due to the law of diminishing marginal utilities, while sharing economy became socially beneficial due to the law of increasing marginal utility through network effect in the online virtual world.

In the 4th industrial revolution, where the online and are offline are converged, reality and virtual started to converge also. The offline economy became a sharing economy through the convergence of reality and virtual of the 4th industrial revolution. According to KCERN, this is the convergence of reality and virtual world where the analog transformation technology of the 4th industrial revolution converged with the digital transformation technology of the 3rd industrial revolution [6]. Therefore, it results in various previous researches that more than half of the entire market will change to sharing economy system.

(Expected) Findings/Results:

As the sharing economy is spreading throughout the world, this research defines sharing platform economy through integrated and general understanding. Also, by definition, the research proposes a national strategy that will promote the sharing economy to the policymakers. Sharing economy requires an integrated perspective from information sharing to the evolving trend of sharing materials and relations. Therefore, the roadmap for expanding the sharing of information, material, and relationship based on the sharing economy cube model is required. The research proposes vitalization of information sharing, regulatory reform for establishing open source ecosystem, regulation reform on the Cloud for O2O platform-based material sharing, creating a good ecosystem for promoting customer welfare, flexible jobs, and job safety net, establishing infrastructure for re-education as detailed strategies for the national roadmap for sharing economy.

Research limitations/ Implications: This study needs further study about new rising sharing economy services and to apply in this unified model. It will be prove the reliability of this model.

(1,104 words)

Keywords: Sharing Economy, Platform, 4th industrial revolution

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Identifying Key Success Factors for Scale-up of Regional SMEs : A Case of Ecopro

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Abstract

Purpose/ Research Question:

- The world economy has been confronting low economic growth for several years (Park, 2017) and industrial trends are being changed very quickly (Park, Lee, Moon, and Kwon, 2016).
- Cooke (2017) argued that South Korea's economy also has had a slowdown in growth
- Thus, it is very important for firms to find the opportunities of growth. Especially, SMEs, Small and Medium Sized Enterprises, with start-ups cannot help thinking they must find success factors for growth (scale-up).
- Korean government supports a large number of money and favorable policies to SMEs in order to boost the economy.
- Nevertheless, there is few SMEs, that achieved great growth, in South Korea; however, a lot of SMEs are trying to achieve the great growth and become an unicorn company.
- Scale-up SMEs and unicorns are contributing the economic growth of South Korea.
- In spite of this importance, few study has carried out.

Purpose

- This study aims to explore success factors for scale-up of SMEs by carrying out a case study, based on Ecopro, an Unicorn in South Korea.

Research Question:

What is scale-up of SMEs and constructs of the scale up?

What are success factors for scale-up of SMEs?

Key Literature Reviews

- This study aims to explore success factors for scale-up of SMEs by carrying out a case study, based on Ecopro, an Unicorn in South Korea.
- A Triple Helix of university-industry-government interactions is the key to innovation in increasingly knowledge-based societies. As the creation, dissemination, and utilization of knowledge moves from the periphery to the center of industrial production and governance, the concept of innovation, in product and process, is itself being transformed (Etzkowitz, 2008).
- Technology characteristics are very important and significant variables to affect the growth of SMEs (Yoon and Kim, 2017).

Design/ Methodology/ Approach

- Observational study and in-depth interview will be carried out for finding success factors for scale-up of SMEs.
- A case study will be carried out, based on Ecopro, an Unicorn in South Korea.
- Approach
- Proposition : Stronger entrepreneurship and technological capacity should have significant relationships with the scale-up of SMEs.

(Expected) Findings/Results

- Stronger entrepreneurship would have a significant positive effect on the scale-up of SMEs.

- Stronger technological would have a significant positive effect on the scale-up of SMEs.

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A Effectiveness of Start-up Intention on Adversity Quotient and Entrepreneurship: Focused on Mediating Effects of Adversity Quotient

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Abstract

Purpose/ Research Question:

The emergence of entrepreneurship is not generated suddenly, but is caused by solving the problems raised in one event or more. This stimulus can be realized through a systematic procedure to solve the problem. In other words, through this process, positive attitudes and attitudes toward solving problems can be said to be manifested in entrepreneurial spirit. Meta-cognition is utilized in the process of solving problems that stimulate the manifestation of entrepreneurship.

Key Literature Reviews:

Meta - cognition is an idea of thinking, a concept of perception of cognition, a function of understanding the cognitive process of an individual and planning, checking, and controlling the process of thinking and problem - solving. In this context, meta-cognition means planning what order to learn in order to solve the problem, effectively checking and evaluating what kind of information is connected to construct knowledge and how to achieve the goal. In conclusion, metacognition is a systematic plan for the performance of tasks as an activity and an accident that learners engage in while learning.

If the function of planning, checking, and controlling in the problem solving process is good, it will solve the problem without difficulty, but if it does not work properly, it will become difficult and frustrated and stressed by psychological pressure. In this case, the weakened meta - cognitive function is expected to increase the risk sensitivity of entrepreneurship and negatively affect innovation and initiative. In the end, the negative effects of entrepreneurship will act as a stimulus to weaken motivation in innovative behavior of individuals.

This study suggests resilience, about what factors may improve the initial metacognitive ability in

the present study. Resilience is contributes to the speed and degree of recovery after being exposed to stress(Brooks, 2009), and it can be said that the resilience is a strong factor in positively converting the negative situation as a result of assimilation and control seen in the negative situation(Leipold & Greve, 2009). Even though the meta-cognitive ability is weakened, if the resilience is well controlled, entrepreneurship will work more positively and it will lead to a more innovative behavior and positive effect on the individual as well as the organization.

Metacognition is actively and intentionally storing and retrieving the relationship of actor-information in its environment. Furthermore, it is the perception of self as strengthened self of self and development of memory as the application which applies all the intellectual means developed by the individual to the problem in memory(Flavell, 1985). Schoenfeld(1985) has emphasized three categories of Intellectual behavior, beliefs and intuition, control or self-regulation, and knowledge about thought processes.

In other words, he emphasized how accurately describe his thinking process and his managerial ability in solving problems in control or self-regulation. He said that one's resources, the process of one's interpretation, and one's mental state are objects to be controlled. In particular, beliefs and intuitions are subjective knowledge of the world acquired through living a cognitive life, so that belief and intuition act as important determinants of behavior as well as control and self-regulation.

In this respect, the relationship between metacognition and entrepreneurship can be defined as an algorithmic relationship. In other words, entrepreneurship can be seen as part of the mental, physical, and situational experience of humans manifested in the course of transforming a series of uncertain situations into certain situations. In particular, entrepreneurship in the spiritual aspect can be said to be an expression of individual 's beliefs and intuition.

According to previous studies, Metacognition is a learning strategy in the process of completing active and innovative behaviors such as self-directed learning. In order for an individual to have the ability to set and carry out learning goals, he or she needs a mechanism to plan, establish and control the learning objectives.

The voluntary plan in self-directed learning assumes that the metacognition should precede the individual's strategic behaviors in order to achieve self-learning by cognitive characteristics(Bae & Lee, 2010). These relationships suggest that metacognition can be an influential factor in entrepreneurial as well as innovative behavior, and that resilience is a moderating role in enhancing the static function of metacognition.

Design/ Methodology/ Approach:

This study will be test to find the relationship between meta-cognition, entrepreneurship and

innovative behavior. First, we suggest that metacognition will be strong related to innovative behavior. Second, in order to make a stable relationship between meta-cognition and innovative behavior, entrepreneurship will be mediating role in a mutual relation. Third, Resilience will have an impact to metacognition. Therefore, we tested to mediating effect of entrepreneurship and moderating effect of resilience how strongly to make connecting between meta-cognition and innovative behavior. We will use the AMOS and SPSS statistical program to verify the hypothesis.

(Expected) Findings/Results:

Metacognition will have a positive impact on innovative behavior.

Entrepreneurship will have a positive impact on innovation behavior.

Metacognition will have a positive impact on Entrepreneurship.

Resilience will have a moderating in the relationship between metacognition and entrepreneurship.

Entrepreneurship will play a mediator role in the relationship between metacognition and innovation behavior.

Research limitations/ Implications:

In the management aspect, we can confirm that metacognition and entrepreneurship are very important factors for the innovative behavior of the members.

The importance of metacognition can be confirmed as a factor in strengthening entrepreneurship.

It can be confirmed that resilience is an important factor in overcoming the negative situation.

In the pedagogical aspect, it can confirm the importance of entrepreneurship education and metacognition learning.

Keywords: Meta-cognition, Entrepreneurship, Resilience, Innovative Behavior.

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Open Innovation, Collaboration, and Trust among and within Public Research Institutions of South Korea

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<Abstract>

As society shifts from a close to open paradigm, open innovation has always been a popular concept to discuss. Despite the fact that there are abundant studies regarding this field, there are still more to discuss about this field. The definition of open innovation is “the use of purposive inflows and outflows of knowledge to accelerate internal innovation and expand the markets for external use of innovation, respectively” (Chesbrough, Vanhaverbeke, & West, 2006). As previous studies such as study by Mention, Torkkeli, and Salampasis (2014) focused on trust that embedded open innovation, Hasche, Linton and Ö berg (2017) focused their study on trust in open innovation examining the case of a med-tech start-up, and Ciesielska and Iskoujina (2012) focused on trust as a success factor in open innovation examining the case of Nokia and GNOME, this study will also concentrate on the impact of trust in open innovation. The purpose of this paper is to see the relationship between trust and open innovation through close investigation of reciprocal trust among researchers and inter-organizational relationships between research institutions in South Korea. In order to attain a precise measure of current trust among researchers and organizations, survey will be done to approximately 30 researchers from Korean science and engineering research institutions such as KRISS(Korea Research Institute of Standards and Science), KISTEP(Korea Institute of Science & Technology Evaluation and Planning), and KIST(Korea Institute of Science and Technology) to examine trust among researchers and other organizations and how this trust impacts innovation. The survey would contain questions regarding this matter, asking about the characteristics of the organization, trust among researchers and institutions, thoughts about innovation and more. After the survey, results will be analyzed using Regression Analysis to see the cause and effect of these two factors. Through this process, this paper aims to find methods for better open innovation through stronger trust among researchers and organizations.

Keywords: Open Innovation, Collaboration, Trust, Public Institutions, Bureaucratic Pathology

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Collaborative Management and Competing Perspectives of Various Stakeholders for DMZ Policy Process

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<Abstract>

This study aims to examine the association between collaborative public management and DMZ policy process using the survey data from government officials of Goseong County, Gangwon Province of ROK, research institutes and related international organizations. Open innovation is a concept introduced by H. Chesbrough in his book to refer to as “a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology” (Chesbrough, 2006). However, when applied in public sector, it could also refer to an open policy process including agenda setting, implementation and feedback to achieve policy goals more practically and effectively. Since DMZ policy process in Korean peninsula should be approached more internationally, there would be various stakeholders, such as central and local government, domestic and international NGOs and even neighboring countries, to be considered. More precisely, this study would like to utilize a framework of collaborative public management. Collaborative public management refers to a concept that describes the process of facilitating and operating in multi-organizational arrangements in order to remedy problems that cannot be solved – or solved easily – by single organizations (McGuire, 2006). We will use survey data and interviews from two different groups. First group consists of government section, including government officials from Goseong County and researchers from National research institute such as Research Institute for Gangwon(RIG) and Korean Institute for National Unification(KINU). Second group consists of non-governmental organization such as Hanns Seidel Foundation(HSF) and other experts such as university professors. Regression analysis will be used to understand the relationship between independent variables and dependent variable. According to one of the latest studies on recent changes in policy and research regarding the Korean DMZ, most of the policies and studies focus on relatively practical issues

such as environment, tourism or sustainable development. Therefore, this study focusing on open policy process and the roles of various stakeholders will give an insight in administrative way to prepare for a future of Korean DMZ.

Keywords: DMZ, Stakeholders, Collaborative Management, Innovation, Natural Resource Management

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**Evaluation for Alternatives of Land Use Plan in the Process of Climate Change
Adaptation**

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Abstract: Land Use Planning should be an important factor for a decision making process in

Purpose/ Research Question:

- Urban development should lead to various changes in Land Use Plan, thus influencing BES (Biodiversity and ecosystem services)
- In the process of EIA should lead to predicting BES and bring mitigation measures in quantitative ways, but very lacking in evaluation
- This study will focus on the amount change of carbon fixation with a InVEST model so that one can select the alternative of land use plan accordingly. This model is a standard in REDD+ for UN climate change adaptation

Methods

- **InVEST Carbon model**

- ✓ Land use plan, Land coverage map with carbon pool, economic value
- ✓ Arc GIS Map : Natural Capital Project, and land coverage map

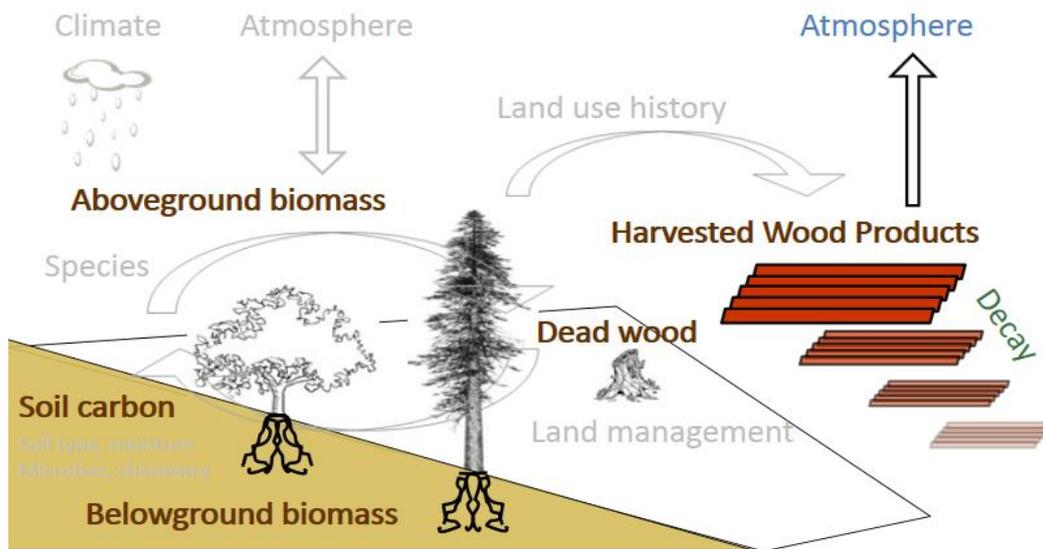


Figure 1. InVEST Carbon model Process (Natural Capital Project 2012)

Input data	File type	Program
Land coverage map	Raster file	Arc GIS Map 10.3
Carbon table	Table(.csv)	Lee et al. 2015; Kim et al. 2017; Natural Capital Project;
Carbon price	Number(7.6)	EEX (European Energy Exchange)
Carbon discount rate	Number(5)	Government post

Table 1. InVEST Carbon Model

Key Literature Reviews (About 3~5 papers):

Lee SD and S. Kwon. 2018. [Carbon Sequestration in the Urban Areas of Seoul with Climate Change: Implication for Open Innovation in Environmental Industry](#). *J. Open Innov. Technol. Mark. Complex.* **2018**, 4, 58.

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Methods

Study Area

-Eco Delta City Region in Busan City with Myungji-dong, Gangdong-dong and Daeje 2 dong

- Before (2000); Pending (2015) and After (2020)
- **Analyzing Carbon Fixation**

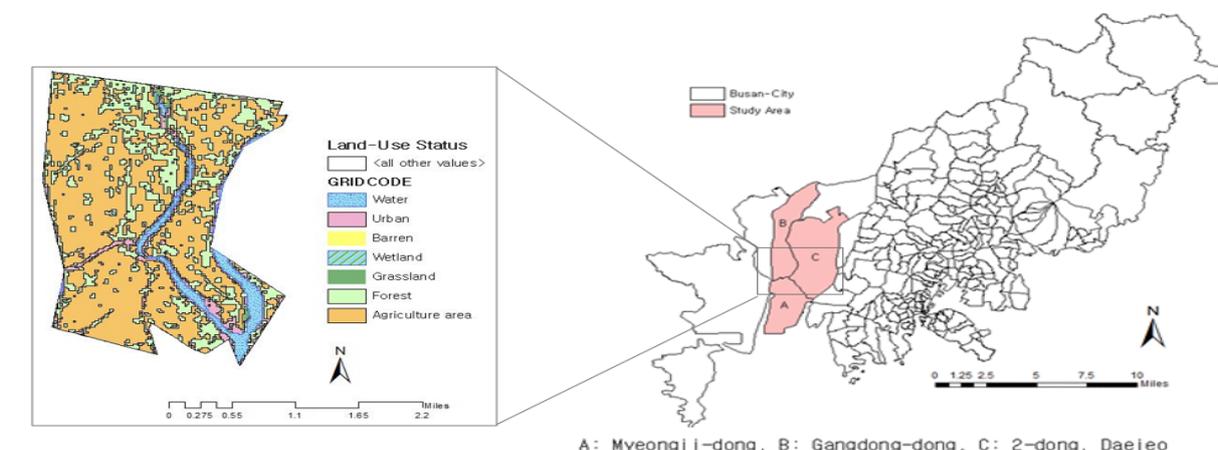
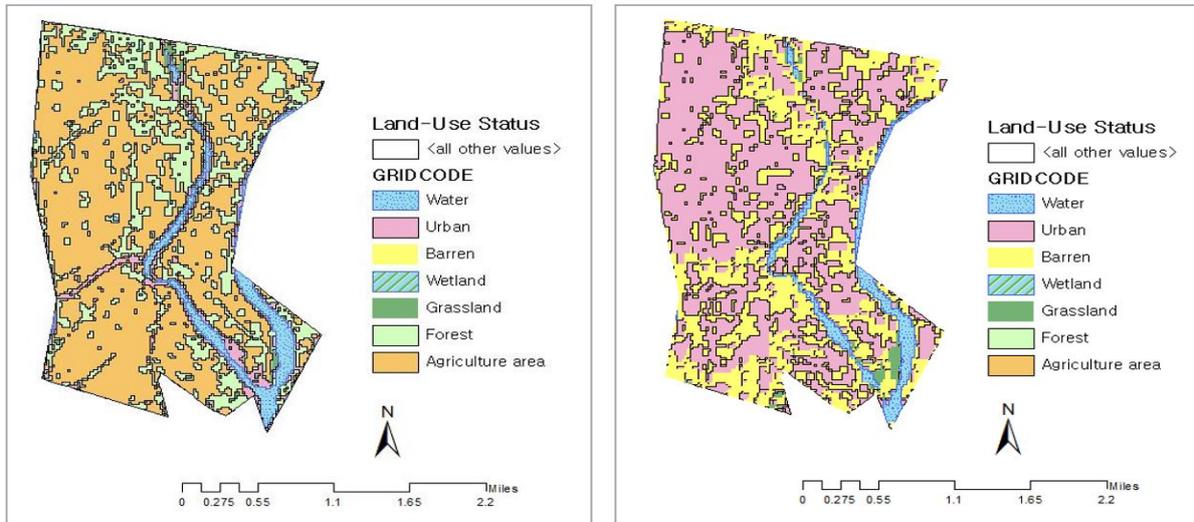


Figure 2. Study Area

(Expected) Findings/Results:



Results

Change of Carbon Fixation

Year	2000	2015	2020
Result map of Carbon Fixation Amount			
Amount (Mg of C)	216,694.48	203,474.25	120,490.84

Table 3. A Value and Result Map of Carbon Fixation Amount and Change in Research Period

- 2000-2015
- Increase in Blue Areas
- Carbon Fixation decreasing about 6% 13,220 Mg of C ↓

- 2000-2020
- Carbon Fixation decreasing 7 times ↓ 44% ↓
- 96,203 Mg of C ↓

Research limitations/ Implications:

- Quantitative Measure with InVEST Model with implication of Change of Carbon Fixation depending on Land Use Plan
- Large Application in the Process of EIA helping decision-making Process (Natural Resources; Greenhouse Gas; and Land Use Plan)
- Adaptation of climate change and Environmental Policy Should be most appropriate

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47.

Climate change and the migratory timing of bean geese in Korea

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Effect analysis of short-term entrepreneurship education program: Focusing on moderate effects of Kolb's learning style

Chung Gyu Byun, Chang Soo Sung

Purpose/ Research Question:

Over the past three decades, the rise of entrepreneurship as an academic discipline has followed a proliferation of entrepreneurship courses and programs in institutions of higher education. This growth has been based on the implicit premise that entrepreneurship education can contribute to the development of students' entrepreneurial attitudes, abilities, and skills, and hence enhance their intentions to launch new ventures. The entrepreneurship education can lower the uncertainty, change the negative perception of entrepreneurship, induce desire for entrepreneurship, and increase entrepreneurial intention. In the initial entrepreneurship curriculum, the entrepreneurial education program is an important process that can increase the attitude toward the entrepreneurship and help to do business. Although universities have implemented educational programs for the activation of entrepreneurship, research on effective entrepreneurial education methods is lacking. Therefore, the purpose of this study is to investigate which educational methodology is effective for student in developing start up preparation behavior, entrepreneurial efficacy and entrepreneurial intention. To do this, this study estimates pre and post results of student's responses for different educational methodologies and classifies students' learning styles based on Kolb's learning test tool.

Key Literature Reviews:

The effects of entrepreneurship training programs are found in entrepreneurial opportunity discovery, entrepreneurial efficacy, and entrepreneurial intention (Oganisjam, 2015; Phillips et al., 2016). However, most research has merely put stress on discussing the individual factors (Park, 2005; Smith et al., 2009; Kim et al., 2017). Self-efficacy is defined here as an individual's belief in and desire to effectively achieve certain targets and tasks (Krueger, 1998). An individual's attitudes reflect his or her desire to perceive potential opportunities. For example, individuals with prior successful experiences and high self-efficacy tend to demonstrate increased motivation to seek out opportunities (Hostager et al., 1998; Park, 2005; Zhao et al, 2005; Pech and Cameron, 2006; Barbosa, 2007; Pihie, 2009). Empirical studies have demonstrated that higher self-efficacy leads to better recognition of entrepreneurial opportunities (Ozgen, 2003). Based on the premise of intention as the single best predictor of ultimate behavior (Ajzen, 1991), there has been considerable interest in entrepreneurial intention, i.e. the intention to start a business at some point in the future, and its determinants (Boyd and Vozikis, 1994; Krueger, 2000). Two dominant models of entrepreneurial intention include Shapero's Entrepreneurial Event Model (1975) and Ajzen's Theory of Planned Behaviour (1991). In the first, entrepreneurial intention reflects the perceived desirability and feasibility of becoming an entrepreneur.

Learning, the means for adding to base knowledge, can also lead directly to new ideas. Experiential learning (Kolb, 1984; Costa et al., 2018), the most appropriate theory for entrepreneurial

learning, focuses on the process of learning from experience versus learning outcomes (Corbett, 2005). Kolb defines learning as the process whereby knowledge is created from the combination of grasping and transforming experience. The learning experience is grasped through either abstract comprehension or concrete apprehension and then processed through reflective observation (RO) or active experimentation (AE). According to Kolb, learners tend to prefer certain learning styles and by doing so exhibit various cognitive strengths and weaknesses. Learners with a diverging style, he argues, tend to be great at brainstorming and are often interested in the arts. Divergent thinking is strongly associated with creative thought, and learners with this style are able to naturally generate ideas. Assimilative learners, Kolb contends, tend to be interested in theory and abstract problem solving; learners with a converging style are analytically oriented and tend to be specialists in technical fields. Accommodative learners also tend to prefer relatively social and action-oriented careers such as marketing and sales. A smaller percentage of learners exhibit a balanced style and are able to adapt their learning style on a situational basis (Kolb & Kolb, 2005; Sharma & Kolb, 2009).

Design/ Methodology/ Approach:

First, we will summarize the previous studies on the effectiveness of the entrepreneurship education program for discovery of business opportunity through the literature survey. Second, we will conduct surveys to verify the effectiveness of entrepreneurship education programs for start up preparation behavior, entrepreneurial efficacy, entrepreneurial intention, and analyze the collected data using statistical programs. We will conduct a pre-post survey for students participating in entrepreneurship education programs. Pre questionnaires will conduct a survey of the demographic characteristics, start up preparation behavior, entrepreneurial efficacy, and entrepreneurial intention before participating in the entrepreneurial education program. The post - questionnaire survey will be conducted on start up preparation behavior, entrepreneurial efficacy, entrepreneurial intention after participating in entrepreneurship education program. For hypothesis testing, we will use paired sample t-test and F-test (ANOVA).

(Expected) Findings/Results:

Entrepreneurship education program can provide motivation to improve start up preparation behavior, entrepreneurial efficacy, and entrepreneurial intention. There will be differences in start up preparation behavior, entrepreneurial efficacy, and entrepreneurial intention depending on learners' learning styles. Start up preparation behavior was high as accommodator, converger, diverger, assimilator. Entrepreneurial efficacy was high as accommodator, diverger, converger, assimilator. Entrepreneurial intention was high as accommodator, converger, diverger, assimilator. Accommodator were higher than other three types of learning style in terms of start up preparation behavior, entrepreneurial efficacy and entrepreneurial intention. Accommodator tend to be more risky than those of the other three types of learning. Their greatest strength lies in practicing work, carrying out planning and experiments, and engaging themselves in new experiences.

Research limitations/ Implications:

Keywords: entrepreneurship education, entrepreneurial efficacy, entrepreneurial intention, Kolb's learning style, start up preparation behavior

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The Effect of Equity-based Crowdfunding Investment on the Corporate Management Performance and Job Creation

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Keywords: Startup, Crowdfunding, Performance, Job Creation, Company revenue, follow-on investment, Venture Capital, Funding, Equity Financing

Purpose/ Research Question:

Long-term growth stagnation and job insecurity continue. Globally in order to secure new growth engines and solve job problems, each country is emphasizing innovation and entrepreneurship, and focusing on fostering start-ups and venture businesses. As a result, the number of start-ups is steadily increasing, and the size of investment in venture companies is also steadily increasing. However, it is a fact that many start-up companies are not exceeding the "death valley". In the process of commercializing ideas, start-up companies can make seed money and develop technology, but fail to obtain additional funds for commercialization and market sales. For example, in 2013, the three-year survival rate of Korean startups is 41.0% (OECD, 2013), the survival rate of new businesses over 5 years is 24.8% and the survival rate over 10 years is only 8.2% (Hyundai Economic Research Institute, 2013).

Recently, the fourth industrial revolution has been actively discussed (Lee et al., 2018; park, 2017; kodama, 2018). In order to take full advantage of these environmental changes, many discussions are taking place to activate start-up and provide timely funds.

As a way to overcome the initial funding problems of venture start-ups, there is growing interest in Crowdfunding, which is a direct financing method by which companies collect funds from the public. The US has enacted the "JOBS ACT (Jump start Our Business Startups Act)" in April 2012. The Republic of Korea revised the "Capital Market and Financial Investment Business Act Amendment" in July 2015 and implemented it in January 2016, equity-based crowdfunding was institutionally allowed.

Looking at previous research on crowdfunding, While reward-based crowdfunding and lending-based crowdfunding research are concentrated, there is a lack of research on equity-based crowdfunding. In addition, research focused on a case research on participation motive factors and success factors for crowdfunding (Kwak & Lee, 2014).

In addition to the participation motive factors and success factors in crowdfunding, there is a need for empirical research on the actual effects of capital procurement through the corporate crowdfunding method on business performance and job creation (Chun, 2015). In addition, there is a need for in-depth research on information asymmetry in order to protect investors and revitalize entrepreneurs through the activation of equity-based crowdfunding (Kwak & Lee, 2014).

The purpose of this article is to examine the factors affecting the funding outcome of equity-based crowdfunding and to examine the factors influencing investment decisions and the effect of funding outcomes on corporate management performance and job creation.

The specific objectives of this article are as follows: First, we will examine how the financial performance of a corporation financed through crowdfunding differs from the average performance in the same industry. Second, we will examine whether companies that succeed in financing through crowdfunding contribute to job creation. Third, we examine the effect of crowdfunding on the attractiveness of investors after funding. Fourth, we examine the effect of funding on the survival of companies through the survival analysis of crowdfunding participating companies. Fifth, we will examine crowdfunding from the viewpoint of investors who have focused on business performance and job creation by attaining the above four research objectives. We will examine to make a meaningful proposal in establishing the government's support policy for crowdfunding as an alternative to initial funding of startups. As a fund raising method for the start-up companies, we would like to make a policy proposal to help the government establish a support policy for crowdfunding.

Key Literature Reviews

The definition of crowdfunding is as follows: Crowdfunding refers to the way a corporation collects the funds needed by an unspecified number of general public through the Internet in the process of developing services or products. Previous research has shown that crowdfunding is the way companies open their business models and receiving investments from an anonymous majority(Ordanini et al., 2011), the way in which a company attracts funds directly from the general public via the Internet without intermediaries of financial companies(Bradford, 2012), recruitment of resources with economic value for the purpose of simple donation, payment of certain commodities in the future, economic compensation or voting rights through open call through the Internet(Belleflamme et al., 2014), individuals and companies collect investments from the unspecified public on the Internet (Burtch et al., 2013).

Classification	Crowdfunding type		Researcher
Investment purpose and investment method	Donation-based	Purpose of pure donation	Burtch et al. (2013)
	Reward-based	Types that are compensated for in a certain category other than monetary compensation	
	Lending-based	Funding through Internet microcredit loans, funding for interest on loans	
	Equity-based	Funding of angel investing type, acquisition of equity proportionate to investment amount, or purpose of profit generation	

Crowdfunding can be divided into four categories: donation-based, reward-based, lending-based, and equity-based depending on the investment purpose and investment method (Burtch et al., 2013). Donation-based is the type of donations that donors do not qualify for compensation but are for the purpose of pure donations. Reward-based are funded by a number of donors funding projects funded by donors, It is mainly used in the field of performance, music, film, education, environment and so on. Lending-based is a type of funding for individuals and businesses that need funds through micro-loans on the Internet. Funding providers participate in funding for interest income on loans. Online microcredit, and peer to peer finance. Equity-based is an angel-type fund for start-ups and entrepreneurs. It aims to acquire stakes in proportion to the amount invested or to generate profits (Kwak & Lee, 2014).

Looking at previous research on crowdfunding mainly focuses on participation motivation and success factors. A research of entrepreneur and Borrower's motivation for participating in the project has shown that it is possible to obtain initial capital (Schwienbacher et al., 2010; Gerber et al, 2012), project success potential and belief as a social proof for other funders (Gerber et al, 2012), and the means of promotional marketing through social media (Hui et al, 2012). Research on the motivation for participation of the fund provider (Investor, Lender) is based on factors such as external motivation factors such as compensation acquisition, interest income increase, intrinsic motivation factors such as opportunities for helping someone, and the joy of participating in new innovations(Gerber et al., 2012; Hemer, 2011; Allison et al., 2015; Lambert et al., 2010).

Research on success factors can be divided into consumer characteristics, investor characteristics, consumer and investor relations, and project characteristics (Kwak & Lee, 2014). Success factors related to the consumer (Entrepreneur, Borrower) are as follows: Analysis of the influence of the size of on-line network, the social capital, on success (Zheng 2014; Lin et al., 2013; Freedman et al., 2008), analysis of the impact of a customer's past project success experience or project sponsorship experience on success(Zvilichovsky et al., 2013).

Investigator-related research has focused on how investors behave. Investigating patterns of investment patterns that demonstrate investor herding behaviors and collective intelligence as variables, there are research that have clarified the cause. (Agrawal et al., 2011; Zhang et al., 2012; Yum et al., 2012). In particular, it was confirmed that the more the cumulative amount raised in the project, the more the investment of the fund provider was increased (Agrawal et al., 2011). Herding Behavior, which mimics other funding providers, appears, and the probability of failure is lower for a project in which the bundle behavior tendency of the fund supplier is large. Based on this, there is a study that argues that crowd behavior in crowdfunding can be rational herding (Zhang et al., 2012).

In the research on project characteristics, researches were conducted on reward-based and equity-based crowdfunding, where the purpose of the project, the size of the target amount, and the project period influenced the success. In the research by Kuppuswamy et al. (2013), it was studied that the target amount is small and the project with short fund recruitment period is more likely to succeed in fund raising. Also, if the phrases "most popular", "recently launched" and "ending soon" were used, more investors could be gathered. The number of updates to the crowdfunding platform contributed to the achievement of the goal, and periodic feedback was found to be an important factor in fund raising. The research by Mollick (2014) shows that the duration of the project is

short, the number of videos included in the project description is high, and the faster the progress update, the higher the probability of project success.

Ahlers et al. (2015) used data from 140 companies participating in Equity-based crowdfunding to examine various factors such as whether a company is listed, awarded, whether it holds a patent, whether the company information is transparently disclosed, and the influence of this on the success of the invasion. As a result, the procurement amount increased when the number of board members increased and the procurement amount decreased when the financial information was not disclosed. Also, the greater the amount of interest to sell, the slower it was to raise the procurement amount, and the sooner we reached the target amount, the more transparent the disclosure of financial information. On the other hand, the company's patents, awards and externality were not affected.

Moon et al. (2018) studied to identify the factors that influence backers who participate in appropriate technology projects through crowdfunding platforms, analyze the connections among these factors, and thereby establish the usefulness of crowdfunding as a viable new funding alternative. Results indicate that the key factors influencing user intention to crowdfund appropriate technology projects include social influence, effort expectancy, and perceived trust. In comparison to the findings of previous studies, performance expectancy was not found to have a significant effect.

Maurao et al. (2018) analyzed the most important aspects for the success of crowdfunding projects observing the Kickante platform, an important crowdfunding Brazilian platform. This research found that the total value per project increased with the number of investors.

Xu et al. (2018) studied resale at reward-based crowdfunding to make more profit after crowdfunding successfully. The results show that a lower financing amount leads to higher prices in the resale stage due to the rationing effect, and suppresses price volatility due to strategic purchasing behavior. In contrast, a higher financing amount enables the creator to build a large capacity, which does not restrict the resale prices and profit.

Chun (2015) analyzed the findings of the crowdfunding study in the United States and European countries. The companies that create net employment are start-ups and start-ups, and it is important to increase the number of start-up companies and increase the survival and growth rate of start-up companies in order to reduce unemployment and economic growth.

Funding was an important factor for the growth of start-ups and start-ups, and equity-based crowdfunding can be an effective and innovative means of funding, and crowdfunding is the driving force of venture capital and angel investors' investments. .

In the same context, Chun (2015) forecasts that equity-based crowdfunding in Korea will become a new source of funding for venture and start-up companies, contributing to the increase in net employment by increasing the survival rate and growth rate of start-based companies. This research suggests the necessity of research on the effect of equity-based crowdfunding on job creation.

Crowdfund Capital Advisors (CCA) conducted a survey of successful crowd funding companies in North America,

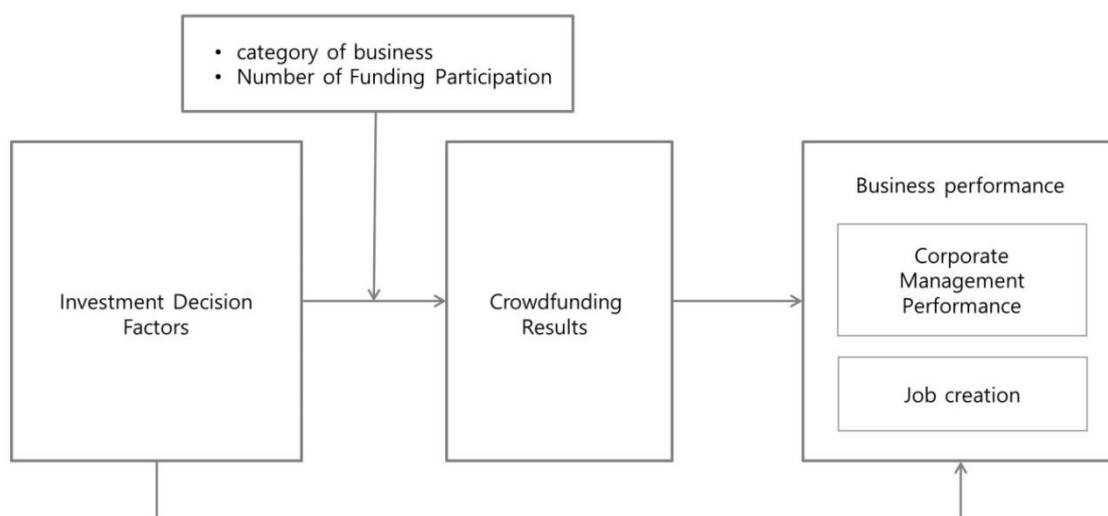
Europe and Africa for one year from June 2012 to June 2013. According to CCA's research report, quarterly average sales growth was 24% in relation to sales growth, while equity-based crowdfunding successful companies had a 351% increase in sales. In terms of job creation, 39% of equity-based crowdfunding successful firms have recruited 2.2 people after funding, and 48% are considering crowdfunding for new hires. Regarding the investment incentive effect on venture capital, 28% of successful companies received investment by angel investor or venture capital within 3 months after funding, and 43% discussed investment with institutional investor. CCA said in its research report that professional investors perceive crowdfunding success as a company that has passed market testing. However, unlike this survey, a company that funded by crowdfunding may have difficulties in management due to the small number of minority shareholders. Therefore, conflicting research by professional investors such as angel investors and venture capitalists to avoid successful crowdfunding company(Chun, 2015).

Design/ Methodology/ Approach:

This article conducted an empirical research on the equity-based crowdfunding platform participating companies with a total of 431 companies. We analyzed 198 companies (87 successes, 111 failures) in 2016 and 233 companies (138 successful, 95 failures) in 2017.

The two main factors that could affect the results of the fund were discussed in two aspects: investor characteristics and company (project) characteristics. In addition, we examined the effect of crowdfunding results and investment decision factors on business performance and job creation.

Key variables were derived based on the existing literature survey. The number of participants (backers), the average investment per person(pledge / backers), the project goal, the duration of the project, financial information, the percentage of equity to be procured and the number of government subsidies were set as independent variables. The amount of funding and the target funding level are used as parameters. Sales growth rate, OP margin, employment growth, follow-up investment attraction, and closure status were included as dependent variables. The year of participation in crowdfunding was the control variable. As a control variable, category of business and number of funding participation. The data analysis was regression analysis.



(Expected) Findings/Results:

The expected results of this research are as follows: First, the financial performance of a company financed through crowdfunding shows high growth compared to the corporate average of the same industry, and there is no significant difference in profitability. Second, the employment of corporations financed through crowdfunding increases, contributing to job creation. Third, the better the result of crowdfunding, the more investors follow after funding. This indicates that the better the funding result, the more positive the signal and the reputation effect. Fourth, companies failing to raise funds through crowdfunding are more likely to close than successful companies. This can be interpreted as the contribution of crowdfunding to raise the survival rate of the initial start-ups that need financing.

Research limitations/ Implications:

The implications of this research are as follows: Funding through crowdfunding will increase the survival rate of early start-ups that have difficulty financing, and contribute to the company's external growth through increased sales and additional job creation. In addition, when the funding results are good, it creates a positive reputation and helps the initial start-up companies to attract subsequent investment. There is no difference between the results of crowdfunding and the profitability of companies. This means that investors who invest in crowdfunding need to be more attention. While crowdfunding has a positive-side to mitigating risk through the wisdom of crowds, it also has negative-side of increasing collective risk by generating herding behavior and free-riding.

This article confirms the positive effect of the crowdfunding platform on funding and growth of the startup companies, which demonstrates the necessity of activating and supporting the crowdfunding platform. However, from an investor's perspective, if the risk persists without mitigating, in the long run the funding market through crowdfunding creates concern that it could turn into a lemon market due to reverse selection.

Currently, governments are providing policy-based funding such as matching funds, low-interest loans, and interest expenses support for successful financing companies through crowdfunding. To enhance the effectiveness of government support policies and increase market participation, it is necessary to strengthen pre-verification(due diligence) to determine the potential value of companies participating in crowdfunding, post-investment support and monitoring. To this end, we propose the expansion of the role as a facilitator of the crowdfunding platform and the involvement of corporate evaluation agencies or start-up specialized agencies with credibility and competence in the crowdfunding ecosystem.

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The impact of multimarket competition on innovation strategy: A case study of the Korean game companies in Japan and China

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Abstract

Purpose/ Research Question

Multimarket contact (MMC) refers to the situation in which more than two firms simultaneously compete each other in several product and/or geographical markets (e.g., Korn & Baum, 1999; Yu & Cannella Jr, 2013). Most studies on MMC have examined how market overlap creates "mutual forbearance" which lessens the intensity of rivalry (Gimeno & Woo, 1999; Greve, 2008). While prior studies have mainly paid attention to how reduced rivalry from MMC influences market entry and exit decisions, only a few studies have paid attention to its impact on innovation activities (Anand, Mesquita, & Vassolo, 2009; Theeke & Lee, 2017). The purpose of this research is to explore how multimarket competition influences different stages of innovation. Specifically, this research will focus on three stages of innovation; content development, commercialization, and protection of IP(Intellectual Property)s.

Methods

This study is conducted as an exploratory research based on industry and firm-level case study. Mobile game industry is a suitable context to this study since on-going upstream and downstream innovation activities are observable for a broad set of firms. In particular, this study focuses on Korean game companies operating in Japan and China due to the following reasons. First, in terms of the market size and growth, Northeast Asian countries represent approximately 40% of the market share (Korea Creative Content Agency, 2018). Second, there are enough players and increasing rivalry among Korean mobile game companies in Japan and China as these two markets are considered to be the first choice market for global expansion.

Propositions and Expected Findings

Multimarket competition and its impact on different stages of innovation

- 1) Content development stage: Content development process can be characterized by high uncertainty and risks, thereby imposing less visible threat to its competitors. Therefore, R&D investment behavior of mobile game companies will be less impacted by mutual forbearance. As multimarket competition increases, more aggressive forms of competitive dynamics on acquiring content development related resources - acquisition of small game companies or equity investment to local game development companies - will be observed. However, when it comes to choosing and launching a new game, companies will try to diversify their game portfolio in order not to create more product overlaps.
- 2) Content commercialization: Mobile game companies typically choose different types of commercialization strategies for their products in different markets. General forms of commercialization strategy includes; 1) direct service through IOS or Android app stores, 2) Using intermediate platforms (e.g., Kakao or Line), or 3) Publishing through local companies by permitting licensing. Commercialization related actions are more visible in the market and can be perceived as direct threat to competitors. Therefore, in this stage, companies will be aware of the benefits of mutual forbearance and they will choose different types of commercialization strategies to lessen the intensity of rivalry among them.
- 3) Protection of IP (Intellectual Properties): IPs in the mobile game industry includes technology patents, trademarks, design patent, and copyrights. Similar to Theeke and Lee (2018)'s argument, I expect that under MMC, the threat of retaliation which generally leads to mutual forbearance in downstream rivalry will not be sufficient to withhold them from protecting their IPs in upstream rivalry. Therefore, as multimarket competition increases, patent filings and patent litigations will be more prominent among those who are competing in the same markets.

Research Implications

This research aims to shed new light about how multimarket competition impacts different stages of innovation process and strategies for product development (Joueid & Coenders, 2018). For an industry which requires generative creativity, commercialization of ideas, and protection of its IPs, it is crucial to understand how to develop defensive and offensive strategies as well as platform strategies (Han & Cho, 2015) under different stages of innovation (Sigala & Kyriakidou, 2015). Also, intensified level of competition in the mobile game industry due to fast market growth makes it practically important for managers to understand how to cope with cooperative interactions with their key competitors (Della Corte, 2018).

Keywords: Multimarket Competition, Game Industry, Innovation Strategy

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Samsung Electronics' transition in M&A strategy and its implication through Harman International cases

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Abstract

Harsh competition fosters enterprise niche and competitive advantages through strategic management. With ability of organizational ambidexterity, it further develops into enterprise evolution of innovative eco system by conducting successful cross-border M&A (Ling ding, Di cao, Taohua Ouyang, Jin-xi Wu, 2018).

Technology companies such as Apple, Samsung, Amazon and Google tend to bet big on the Auto market these days. According to these companies, software and electronics are playing an increasing role in the automobile industry, with automotive electronics estimated to account for upwards of 30% of a modern vehicle's cost (Trefis Team, 2016). Conversely, car manufacturers are also entering into partnership with IT companies in the full awareness that they cannot manage the massive task of digitization alone.

R&D backed up and oriented firms get uncertain challenges when they ran their businesses in unforeseeable circumstances. These R&D intensified firms face both product innovation challenges and diminishing product life cycles. The own way of survival is adapting durable sustainable capabilities and diversify themselves in order to maintain cycles for technological

and development capabilities (Shantanu Dutta, Vinod Kumar, 2009). Especially, the market for automotive electronics is expected to grow to over \$100 billion by 2025, according to Samsung.

In a bid to enhance their competitiveness, Samsung's concern with acquiring or integrating with other organizational resources using the intellectual capacities of existing organization (Akram Sadat Hosseini , Sanaz Soltani , Mohammad Mehdizadeh, 2018). This is why the technology giants are changing their strategies and approaching the market in different ways.

As matter of a fact that numbers of ongoing arguments on whether competitive edge has shifted towards dynamic economy of convergence including integration as firms' catalyst to boost their competitive advantage for future survival (Hangsik Park, 2017). The recent seized opportunities from Silicon Valley firms (Apple, Google, etc.) appear to be betting big on building connected and self-driving car platforms that they could potentially license out to automotive firms, Samsung's initial focus is more hardware-oriented. And Samsung has identified highly profitable business opportunities in the automotive industry.

Samsung then made a bold decision. Deliberate breaching and thorough planning has initiated by streamlining its operation at the first place. Samsung began slim structuring from 2014 by selling Samsung general chemical co., Samsung total, Samsung Techwin, and Samsung Tales to Hanwha (Choi, 2016), Samsung SDI's chemical division to Lotte, and its printing business to HP, and is reportedly looking to sell its PC-making division to Lenovo.

Meanwhile, Samsung was planned for its transition to automotive supplier for company's long-term perspectives (Samsung Newsroom US, 2017). Samsung made a huge bet for the game changer; further access to new automotive technology, Samsung is creating a fund to invest in an array of technologies needed to enable self-driving and connected cars, from sensors and machine vision to AI and security.

Samsung's advances can be described as the concept from "learning by using", deciding the optimal performance of a durable capital good as they affect the length of useful product life. The appropriate application of learning-by-using might be a crucial IT business strategy (Fumio Koadama, 2018). Accelerated electronization and digitization gave good reasons for Samsung's re-entry on the automotive market.

More clearly, while Samsung views connected car technologies as one of its largest growth

axes, it turned eyes to automotive electrification business for next generation growth engine, snooping around automotive and soon negotiating with Magneti Marelli and Harman international behind the curtain.

As a result, Samsung completed the biggest acquisition ever on March 11th, 2017, Samsung Electronics purchased Harman International Industries, Incorporated, valued at about \$8 billion (Samsung News room US, 2017). Under the terms of the merger agreement, HARMAN stockholders will receive \$112.00 per share in cash. According to insiders, this acquisition is considered to be a less risky, yet lucrative bet in the near term. Purchasing Harman is just the beginning of business reshuffle in the era of the fourth revolution.

Purpose/ Research Question:

1. Software and electronics are playing an increasing role in the automobile industry, with automotive electronics estimated to account for upwards of 30% and \$100 billion market by 2025.
2. Car manufacturers & IT companies are collaborating together to adapt electrification technologies respond market place changes.
3. A moderate observer and hermit, Samsung Electronics made quick move to compete for preoccupancy in this new automotive electronics market.
4. See the background and process on merging Harman by Samsung, and how it will be affect in the automotive eco-system as well as its next generation growth engine.

Key Literature Reviews (About 3~5 papers)

Forbes, 2016. Why Samsung is buying harman

Routledge, 2018, Ruth Taplin. Innovation, Investment and Intellectual Property in South Korea: Park to Park

Automotive industries, 2017. Samsung and HARMAN launch a new Autonomous/ADAS Strategic Initiative

Design/ Methodology/ Approach

- I. Background
- II. Automotive industry
- III. Samsung in M&A market: Transforming to the major key player
- IV. About Harman International Industries, Incorporated
- V. Samsung's M&A negotiation story behind the curtain -Weighing in between two options- Harman & Magneti marelli
- VI. Samsung's Revisit to the Automotive Industry
- VII. Samsung-Harman Integration Process
- VIII. Samsung-Harman new products
- IX. Post-merger harmonization: Samsung-Harman incorporated

(Expected) Findings/Results

1. Automotive directivity.
2. Autonomous driving and automotive electronics convergence.
3. Alliance & cross-overs between IT and automotive.

Research limitations/ Implications:

1. Due to confidentiality by the stakeholders, there are limited information in detail report or access for behind stories.
2. The deal transaction has accomplished lately, the joint company's R&D is still ongoing process and premature for tangible fruition.

Keywords

Automotive electronics, Samsung-Harman, Autonomous driving, M&A, Cross-border M&A, Convergence, Market access, Innovation, Competitive advantage

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Multiplier technology factors and technological DNA

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Abstract

In this study, we analyze the nature of Disruptive Innovation in terms of technical DNA. To do this, we first extract the technological DNA and environmental condition elements that are fundamental attributes of products and services from existing technologies. Then, we predict the possibility of DNA change depending on the correlation between extracted technological DNA and environmental condition elements. Finally, in this paper based on the case findings, we suggest "Multiplier Innovation" rather Disruptive Innovation. Technological DNA was not changed when Disruptive Innovation occurs. In this sense, this paper can contribute to new study of Innovation theory. As adaption of "Multiplier Innovation" theory rather Disruptive Innovation, we can explain the advent of new industries by fusion or convergence of technology DNA.

Keywords: Innovation, Disruptive Innovation, Multiplier Innovation, Technology DNA, Technology evolution, Product and Service evolution, New Industry

1. Introduction

In 1980s, Sony's 'Walkman' seemed Disruptive products when it first came out, but in reality it was a product with few new technologies. The Walkman designer removed the recording circuitry and speakers from a compact cassette recorder called Pressman, adding a small stereo amplifier and earphones. The result was less speakers, less energy, less product size, smaller batteries, and a product that allows us to listen to music while we're exercising without disturbing others. The Walkman has given a new way of life style by providing a variety of functional accessories. After that, people can afford to enjoy physical activities while listening to music simultaneously. The Walkman's unprecedented combination of portability and privacy made it the great ideal products, and by 1986 the word 'Walkman' had entered the Oxford English Dictionary. There are so many cases like Walkman's success in the market place.

Interestingly, however The Walkman had far away from breakthrough technological achievement, and was not giant leap forward in engineering technology that had been around since 1963 (Richard, 2002). What is uniquely apparent in the case of Walkman is that Sony utilizes not new advanced technologies but existing multiple technologies. The theory of Disruptive Innovation introduced in 1995 has been recognized as strong tool to explain Innovation activities. Despite broad dissemination, the theory's core scheme of Disruptive Innovation has been misapplied. In that sense this paper is to find another way so called 'Multiplier' Innovation rather Disruptive Innovation by investigating the phenomena of Innovation successes through the analysis of technological DNA.

Technology Innovation is the process of meeting cost and marketability and solving problems (Dosi et al., 1988). Continuous changes in the business environment have made

it important for companies to innovate based on discontinuous convergence to create value for new dominant products and to identify potential needs through interdependent learning with customers (Miller and Moris, 1999). In this study, we point out the nature of Disruptive Innovation as the emergence of other new technology by breaking down the existing technology, pointing out the mistake and suggesting that it is the existing application rather than the technology destruction. In other words, it will be called Multiplier Innovation instead of Disruptive Innovation. We will discuss it again later, but this paper suggests that the word destruction of Disruptive Innovation means only a new application of existing technology. The purpose of this study is to review the existing framework of the Disruptive Innovation theory. In addition, through reviewing the Disruptive Innovation activities, we will emphasize the need for Schumpeterian Innovations as well as Disruptive Innovation in the Innovation activities of companies for continuous growth. In addition, this paper contributes to academic research in that new industries can emerge due to the fusion of technical DNA through the Multiplier Innovation theory presented in this study. This paper is organized in five sections where Section 2 presents literature review in detail and presents research Frame and process of Multiplier Innovation. In section 3 describes the findings. In Section 4, Conclusions are drawn from the analysis, and presents implications.

2. Theoretical Review

Disruptive Innovation requires detailed and distinct strategies, rather than sustained Innovation. In addition, businesses developed through Disruptive Innovation can't achieve

substantial profits in a short period of time because they are aimed at new markets or sub-markets. Disruptive Innovation designs products and services that reflect current customer needs, it also innovates new products and services by analyzing and understanding the new, undiscovered needs of people.

Insert Figure 1 here

Insert Table 1 here

In this respect, it can be interpreted that the Disruptive Innovation is to change the product or service based on the understanding of the problem that the customer can't solve from the viewpoint of the customer. We need to redefine this Innovation that reflects the needs of our customers as a Multiplier Innovation. We will analyze the similarities and differences of Disruptive Innovation and redefine Disruptive Innovation on the basis of intermittent equilibrium theory which is focused on evolutionary theory.

Evolution by natural selection occurs when three conditions are met: mutation, genetic (replication), and adaptability. Dual adaptability means that populations of living organisms with genetic elements suitable for a particular environment are increased by competition and selection (Lewontin, 1970). Kirsh(2006) defined the ecosystem of a product to explain its evolution. We defined a family as a species, a collection of related product groups such

as screw and driver as a collection, and a consumer as a group. What it means to use the product is the technology and method that the user has evolved to solve the given task.

Insert Table 2 here

Products evolve through the interaction of producers and consumers (Fleck, 2000). Product evolution distinguishes products that are removed or selected from competition, such as biological evolution, and generates a variety of products by mutation and recombination (Ziman, 2000). The development of new products is determined by the routines of the firm and the consumer's choice (Danneels, 2002). Routines are regular and predictable corporate behavior patterns and genes. Routines include the technology routines required for production, employment procedures, priorities for inventions, R & D, business strategies, etc., and have genetic characteristics such as the genes of the organism being passed on to the next generation. Search and culling are characteristics of simultaneous and mutually influencing biological evolution. Market prices affecting the culling process affect the direction of the new search. This search and culling process evolves the firm, and the industrial conditions at one time determine the industrial conditions for the next period (Nelson and Winter, 1982). Economic factors determine the timing at which technology communities and firms choose or reject a new paradigm at the time of the technological paradigm shift (Constant, 1984). Technology has been heavily

influenced by economic factors (Ronald and Trevor, 1996), as successful technology is not introduced into the market if the economy is inadequate. Designs that are considered optimal are often modified by consumers' needs (Mackay et al., 2000). Gyroscopes have evolved as a result of the involvement of outside factors such as lab vision, interests, pressure from the Air Force that wanted a more sophisticated and inexpensive gyroscope, and competition between large corporations (MacKenzie and Judy, 1985; MacKenzie, 1987).

The development of bicycles was not technically inevitable, but was done by negotiations among people (Bijker et al., 1987). Basalla(1988) and French(1988) found similarities between technological advances and life evolution through various features of hammer, wheel, and other techniques. Basalla(1988) defined product evolution as four concepts: diversity, continuity, novelty, and choice. Diversity means that a product is an inevitable outcome to meet human needs, and continuity means that an ancestral product exists in every new product. In addition, novelty means an indispensable part of the artificial world, and choice means a decision to replicate a new product or add it to an existing product.

The development of the car was not due to the internal tendency of the car to be better, but to the new product experiments of the manufacturers that came from the buyer's demand. In the automotive industry or in the history of life we have not found any teleological power or mechanical determinism (Mayr, 1997). According to Darwin and

Beer(2001), biological species evolve (adapt) or be culled in a changing environment of natural selection and survival of the fittest. Likewise, technology evolves to meet the specific needs of the owner, such as organisms (Lewis, 2007). Technology has developed with the aim of overcoming human natural (animal), external limitations(Drucker, 2010).

New entrants who adopt radical Innovation introduce new products and grow as demand grows (Abernathy and Utterback, 1978). Rogers(1976) also found that consumers' perceptions of new product characteristics have a significant impact on product proliferation. Understanding consumers is an important factor in product success (Myers and Marquis, 1969). In particular, the understanding of which product quality and innovative features consumers like is most important to the success of new products, and understanding these consumers' preferences speeds product evolution (Cooper, 1979; Cooper and Kleinschmidt, 1987). When demand and production increase and applications for specific Innovations take place, new entrants appear with variants (Utterback, 1994).

Burton(1977) suggests that firms introduce new products as a process of testing and feedback on what the market demands. This implies that the use value that buyers feel is more influential on price than the direct cost of product production (Hippel, 1988).

Companies imitate the functions of competitors' superior products through imitation strategies, and then introduce innovative products after successful imitation (Beckenbach

et al., 2012). Evolution occurs as a result of progressive and radical product Innovation of companies (Orihata and Watanabe, 2000). Technology wants to increase the likelihood of efficiency, opportunity, emergence, complexity, diversity, specialization, ubiquity, freedom, interdependence, beauty, intuition, structure, and evolution as life (Kevin, 2010).

According to a study by Haring(2001), evolution has three attributes. The first attribute of the theory of evolution is that each species has a slightly different appearance, even if it belongs to the same species. The second attribute of evolution is that all plants and animals live in intense competition. The third attribute of evolution is that the traits found to be beneficial are located in most species within the species with the help of heredity. Given this evolutionary nature, we can conclude that the same species diversity and intense competition in nature of all plants and animals make it possible for genetics to change species (Darwin and Beer, 2001). Dawkins(2006) has backfired with the theory that only the genes surviving in the process of natural selection are followed by the later theory, which suggests that the nature of the species is not changed by environmental selection. To summarize the main contents of this evolution, it can be seen that all living things are differentiated into new species as a result of genetic variation of the species due to environmental influences, and the differentiated species are survived by natural selection. This evolutionary perspective is similar to that of the Disruptive Innovation described in

the previous chapter. First, in terms of the survival environment, as living things exterminate, evolve, and survive according to the influence of nature, products and services are also used as products and services. It can be seen that it is extinct, evolved, and survives depending on the influence of the customer (market) in which it belongs. Second, in terms of the process of evolution, it can be said that the repetition of progressive microevolution and interdependent macroevolution is similar to the repetition of product and service in sustained Innovation and Disruptive Innovation. Third, it is similar that new products and new markets are created by the evolution of life, the birth of new species, and the Disruptive Innovation of products and services. Fourth, in terms of the conditions that cause evolution, it is similar that Disruptive Innovation takes place through rapid changes in technology and market environment, such as the dawn of rapid changes in the natural environment. Therefore, it can be seen that living things, products and services are mutually consistent in terms of survival environment and evolutionary process, evolutionary result, and evolutionary condition.

In light of this, the Disruptive Innovation determines the fundamental attributes such as the genes possessed by the product or the service, and then defines the Innovation as a form in which the form of the product or service changes according to the change of environment, Can be. In the sense that the meaning of the word "destruction" is meant to

completely destroy the existing one, it is indeed appropriate to attach the word Disruptive to a form of Innovation that evolves towards an optimal state, not the fundamental nature of a product or service, I wonder if it can be called expression. We will revisit the theory of Disruptive Innovation by presenting evolutionary hypotheses and models of products and services based on evolution, and redefine the meaning of Disruptive Innovation according to the results of gene substitution.

2.1 Product and service evolution hypothesis

First, products and services evolve toward optimal conditions as the environment changes, and companies control them. Second, only products and services that have evolved to optimal conditions are selected by the customer (market), and the rest are gradually scrapped. Third, products and services evolve by the needs of customers (markets), and the underlying attributes (DNA) that determine species of products and services do not change. Fourth, when the DNA of products and services is changed appropriately to the environment, Disruptive products and services with new customer values are created and new markets are created. The evolution of products and services consists of DNA and technology, the fundamental attributes of products and services,

environmental conditions affecting products and services, such as changes in markets, and products and services innovated by the enterprise. DNA is a fundamental property that has been preserved unchanged since the first product or service was born. Therefore, DNA is a common attribute found in past products and current products through evolution of products. Environmental conditions include products that provide customer value from DNA, physical elements such as materials and technologies that affect the appearance and functioning of the service, psychological elements that dominate the customer's perception of the product, and an acceptance condition element of the attribute formed by the service. We have used the following method to demonstrate that DNA is replaced by a customer (market) choice when new products or services are applied to it, and new forms of Innovation occur, using the above evolutionary model. First, we extract DNA and environmental condition elements that are fundamental properties of products and services. Then, we predict the possibility of DNA change depending on the correlation between extracted DNA and environmental condition elements. Finally, based on the results obtained, we compare the resultant difference with the theory claimed by the existing Disruptive Innovation and redefine the Disruptive Innovation as a new meaning of Innovation.

2.2 DNA extraction

In order to extract the DNA of products and services, we used the following method to analyze the fundamental attributes (customer value) that do not change to past and present products in a specific field. First, the product evolution process is created using the product and service evolution model. At this time, we record not only the products of the currently selected company but also the major products from past to present including names of other companies in name and form. Second, under the product evolution process, write the underlying attributes and the improved attributes in the order of evolution. Among the initial attributes of products and services, those that do not change constantly are written in the essential attribute part, and the improved attribute is written in the improved attribute part.

Insert Table 3 here

According to a study by Schilling(2010), the portable personal digital assistant (PDA) industry has become a dominant design competitor to major companies such as Nokia, Motorola and Samsung after the initial PDA industry, and the successful launch of Palm Pilot and Black Berry It has gone through an evolutionary process that has led to the market share of the late-entry Apple iPhone. The PDA evolution process can be expressed in the following form. Like the above process, PDA has been continuously evolving since

the occurrence of the initial PDA industry to the present, but the fundamental nature of software, memory, connectors, and information input devices based on batteries has been maintained. The means to enter information during the course of evolution has changed from electronic pens to QWERTY keyboards and touchscreens, but this is an evolution of performance.

2.3 Extraction of environmental condition elements

Environmental condition factors can be divided into technologies and other products that can affect the evolution of products and services, and customer perception. The technology element extracts five to ten key core technologies that are relevant to the product. The third-party element creates other rapidly evolving products with attributes. The perceived space factor consists of lifestyle and customer needs.

Insert Table 4 here

2.4. Gene replacement

By analyzing extracted DNA and environmental condition elements, companies can predict the direction of DNA substitution that can provide new customer values that are completely different from existing products. To replace the DNA, first prepare the table by

comparing the environmental condition elements with the extracted DNA elements. It then links the DNA elements individually one by one to the environmental condition element and predicts how the environmental condition element can change the DNA element and thereby create some innovative customer value. Finally, we assign DNA sequences to the DNA element replacement candidates, assign them to environmental condition elements, and select the DNA substitution patterns that are expected to provide the most innovative value.

Insert Table 5 here

The following is a description of the iPhone's Disruptive Innovation by applying the gene substitution table to the aforementioned PDA. PDA DNA consists of information input device, software (OS), modem (connector), power (battery) and memory. Applying a different product element called Black Berry to the PDA information input device DNA element can add a new DNA element to the smartphone called a phonetic keyboard. This will provide new customer value to those who have difficulty using iPhone on the touch screen. Next, by applying the Customer Needs space element to the PDA software (OS) DNA element, we can add a new DNA element called OS that reflects the customer's actual needs. This will provide new customer value for those who are uncomfortable with software such as Android and iOS.

In addition, applying the technology element of wireless communication to the PDA modem (connector) DNA element, a new DNA element with new functions can be added, such as faster communication speed and electronic payment function. As a result, it is possible to supplement the existing unstable communication state, and to provide a derivative additive function such as an electronic payment function that solves the problem that the user feels uncomfortable in offline. And by applying other product elements called Xiaomi battery to the PDA power (battery) DNA element, it is possible to add a new DNA element which is small in size but large in capacity. This can provide new customer value by proposing an alternative battery that solves the problem of being inconvenient due to the easily drained battery capacity. Finally, applying the Job-aware spatial element to the PDA memory DNA element can add a new DNA element that can digest detailed functions according to the occupational group. This provides new customer value by providing specialized memory for specific jobs or jobs requiring high performance memory. An example of advanced gene substitution is a combination of DNA elements and environmental condition elements of iPhone that are trying to provide new customer value while preserving the DNA of existing PDA. It will be a good tool to provide new customer value.

3. Success stories of Disruptive Innovation

Delight hearing aids have been patented to standardize hearing aid specifications by measuring the size and depth of the ear of a Korean person and obtaining an average value, away from the conventional method that was customized to 1: 1.

Bymom indoor tent is a fixed type indoor tent, it is impossible to control the size of the existing tent, it can change the size according to the size of the living space to apply the patent, effectively creating the effect of space heating.

Insert Table 6 here

The hive electric driver can be used anywhere, anytime, thanks to the miniaturization and USB charging patent. Even though it is 10cm in size, it succeeded in providing buffering and 400 usable screw-in practicality in 90 minutes.

Ecomine Hair Removal Shampoo is made by applying 6 kinds of natural-friendly new materials (ginseng cultivator, salvia, saw palmetto, nettle, horse chestnut, ginger extract) and activates cell division of damaged and weakened hair cells by supplying nutrients to scalp.

Piumlabs diffuser allows you to select and adjust a variety of scents to suit your situation. The diffuser communicates with smart home furniture through Internet (IoT) technology

to determine whether it works directly. It communicates with rice cooker and stops fragrance emission at meal time, or communicates with shower and sprays refreshing fragrance for user who finished shower.

Ssollock originally developed as a transparent lock made of a transparent material and easy to confirm the state of loosening.

Marin Techno has become aware of the fact that various products such as collagen, health supplements and cosmetics depend on importing a lot of raw materials, and the byproduct of food classified as food waste has 90% It was found that the utilization rate was very high. Here, we have developed a patent that can produce 99% high-purity marine collagen in high yield, produce byproducts that can be discarded as raw materials, produce economically, and create synergistic effects of linked industries through resource recycling and high value-added products .

Nexsys use a wearable device is used to measure a bio-signal of a specific person, to shoot an image of a specific surrounding environment together with the wearable device, and then to transmit the measured bio-signal and the captured image to a person at a remote location A signal generation method, an apparatus therefor, and a system thereof have been developed.

Purple's SoundTAG, BLE is a technology that allows a smartphone to recognize the signals that are embedded in the inaudible band. It can receive information without activating Bluetooth, and because it uses off-line speakers, Bell received a lot of attention from companies that utilize it.

Zikto's wearable band Aki (Arki), which recognizes and corrects the wrong gait, goes one step further from the existing wearable band that offers only the number of steps, calories, etc., and is called 'Sound Walking' Equipped with calibration function. When a user walks with a wrong gait (such as seeing a smartphone or walking with his / her hand in his / her pocket), he / she automatically recognizes the gait and gives a light vibration to the wrist band.

The Disruptive Innovation success cases have the following common features.

First, when compared with existing technology, it contains similar patent contents in the basic technology aspect, but it is necessary to clarify and reflect the limitation of existing technology and market needs, and to provide products, services.

Second, when compared to existing technologies, functionality was minimized, centralized, and cost savings drastically reduced.

Third, even if there is no existing technology, it will not only pioneer new markets by

presenting solutions that can solve these problems.

This result is characterized by the fact that the minimal function, low price of the Disruptive Innovation wins the competition with the products and services of the mainstream company and the new market is created by meeting the needs of the customers who did not use the existing products and services for economical or functional reasons Feature. Ultimately, the technology applied to the Disruptive Innovation is also the same as the existing technology in the DNA of the product or service in a specific field, but it is proved that it is slightly different in accordance with the change of the environmental conditions such as minimum function, low price, it is.

As a result, new industries emerge through technical DNA and Multiplier Innovation.

Technology DNA causes Multiplier Innovation through fusion with other technologies, resulting in more than double the synergy.

Early Amazon began its online book distribution business as its main business, but aims to provide all the products and services that customers want based on accumulated row data through e-commerce, expanding business areas into the cloud, IOT, and AI fields did.

This is evident in Amazon's aggressive M & A. In the case of Amazon Echo launched in 2015, Alexa internet's data base technology acquired through Amazon's existing row data

and cloud technology M & A, YAP's voice recognition Technology, Evi's semantic search engine technology, and INOVA's text-to-speech technology (TTS, Text to Speech). Having completed Amazon Voice Service in Amazon Echo, Amazon soon released Alexa Skill Kit. This API allows developers other than Amazon developers to develop apps or devices that can be controlled by voice. As Alexa can be used even if Amazon does not offer it directly, products with Alexa have started to be released in 2016. This means that both the intelligent device ecosystem and the Internet ecosystem of things, centering on Amazon's intelligent voice secretary "Alexa" And the emergence of new industries. Just as Amazon is growing as a cloud and big data-based comprehensive retail company with new technology DNA and Multiplier Innovation, the combination of Alexa API and new apps and devices will emerge as another new marketplace, entertainment and IOT industry.

Block-chain technology is a technology applied to the financial sector to prevent double payment using P2P networks. Bitcoin, a leading example, is a means to exchange value among users without a management organization such as a bank or a credit card company. '37 Coins' showed a technology that can send and receive bit coins only by mobile phone text messaging (SMS) in underdeveloped countries where banks and remittance companies do not enter. The reason for the start-up 37 Coins to enter the international remittance market with less commission fees without having an international infrastructure is to

optimize Bitcoin technology DNA to adapt to market needs through Multiplier Innovation.

'Made Safe' uses block-chain technology for cloud storage services such as 'dropbox' to manage P2P storage space. The data on Made Safe is encrypted using the user's computer resources, and stored in a place where the data is stored so that no one can know it. Only the person who uploads the data can decrypt the password to use the data or share it with other users. You can use unlimited storage space at no extra cost because you can take advantage of the storage space shared by others. There is little management cost for the network where the users are gathered to manage the system by themselves. This is also a representative example of applying technology DNA to Multiplier Innovation. Block Chain Technology DNA transforms existing management-oriented services into P2P-based user-centric horizontal services and new industries are emerging through Multiplier Innovation.

Autonomous driving technology was created by combining existing automotive system technology with AI computing technology. NVIDIA has developed AI computer Pegasus, which is an essential technology for autonomous transportation, camera analysis, perimeter awareness, location, route planning, and 320 trillion calculations per second. GM acquired an autonomous navigation system technology by M & A of Cruise Automation, and Google's parent company alphabet entered the infrastructure for autonomous driving only.

Samsung Electronics is collaborating with Cacao's autonomous data mining technology, and LG Electronics is collaborating with Qualcomm to jointly develop autonomous navigation solutions based on semiconductor technology. The automobile system technology DNA and the AI computing technology DNA encountered the new industry called self-driving transportation system. Through this, it is possible to reduce the cost of ownership of automobile and to adjust the shared economy such as autonomous driving, innovating.

The delivery technology DNA and IOT technology DNA encounters have also led to Multiplier Innovation that enables delivery beyond the existing delivery service to the home. ICA, a Swedish grocery company, has provided In-fridge Delivery, a refrigerator delivery service, on April 19, To this end, ICA collaborated with Post node delivery technology, Glue's Smart Door Lock technology. Wal-Mart had a pilot service in August 2017, delivering it to the refrigerator in the absence of the owner. When you order ingredients, fruits, etc., the delivery service staff directly enters the house and pours food or fruit into the refrigerator. Wal-Mart has used August Door's smart door lock technology for this service. At the time of delivery, a temporary password will be given to the employee only once, and will be changed to the original password upon delivery. Amazon is also considering delivering services to homes and car trunking services. For domestic shipments, Amazon

will partner with 'Garageio', a garage door locker, and 'Phrame', a car trunk opening and shutting device, when shipping to august home, car trunk, smart door locks. The carrier receives a temporary password that can be opened only once through the smartphone application and enters and leaves through the door locks of the 'August' or 'Garageio' garage door locks. To secure the trunk delivery service, it gives remote access privileges remotely and warns after a certain period of time. In 2015, Amazon piloted the trunk delivery service in Audi and Germany. German electronics companies Siemens and Bosch have jointly established Bosch-Siemens Smart Home (BSH), a smart home platform specialist. BSH has been collaborating with various companies to provide smart home platform and commercialization of various services. In last IFA 2016, Bosch and Siemens introduced a service that links electric oven-refrigerator with food delivery. It uses the camera of the refrigerator to check the contents of the refrigerator, and orders the ingredients in the recipe from the amazon fresh. The service has expanded from IFA 2017 to Tesla. It is a service to check the contents of the refrigerator through the Tesla head unit and to order the ingredients in the recipe from Amazon Fresh. Siemens said it plans to provide related services in cooperation with Tesla at the end of 2017. BSH's services are not delivered in the refrigerator, but it is sufficient to expect another new industry to emerge as it can evolve into a service that connects refrigerator ordering, payment and

delivery.

The technologies of agriculture, fishery and livestock industry and the DNA of IOT technology contribute to the development of smart agriculture, fishery and livestock industry through Multiplier Innovation. Underwater drones used in conventional air drones are used in the aquaculture industry to monitor fish farms such as fish monitoring, fish harvesting, and feed farming to create a new industry. Deep Trekker's underwater drones are used for removal of fish bodies and maintenance of nets through Mort 'Retrieval System technology' and 'Net Repair Tool technology'. Power Vision's underwater drones are equipped with underwater sonar detection, fishing rods and lights. It is used to wear a VR headset and enjoy fishing.

The combination of eyeglass technology and IOT technology has led to the emergence of smart glass, which is increasing the efficiency of work in many industries. Google Glass is used in product assembly, inventory control, and patient care, combined with AR technology. GE uses Google Glass EE instead of an engine assembly manual to assemble the engine, and DHL manages inventory and carries goods with Google Glass EE. Duke Energy uses 'Smart Flash' for Coffin's 'Golden-I technology', XOI technology's 'Vuzix MX100' platform technology and ATHEER's 'Atheer Air technology' to develop telescopes, educational application development and warehouse management.

Insert Figure 2 here

Insert Table 7 here

4. Conclusion

From the results obtained through gene substitution, it can be seen that even though the environmental conditions change, DNA, which is a fundamental property of products and services, is constantly maintained and unchanged. The improved attributes of the evolution of the product when it was applied to the environmental condition elements were continually added and changed, but the original properties maintained from the time the product or service first came into existence were unchanged. The same results were obtained in the case of successful examples of Disruptive Innovations through patent DNA. Given these results in the light of the word Disruptive Innovation, the name of Disruptive Innovation needs to be redefined. The word Disrupt means to completely destroy an existing one. The word Innovate means to change, discard, or renew an old organization or custom. Considering that these two words are combined to create Disruptive Innovation, products and services created through Disruptive Innovation should not only be in its form,

but also completely destroyed by the DNA that it had when it was born. do. Innovation theory, products and services, which we have called Disruptive Innovation, have survived to extinction or evolution according to the influence of the customer (market) in which they belong, just as life forms are extinct, evolved and survived according to the natural influences. And, in terms of the process of evolution, life repeats continual Innovation and Disruptive Innovation as it repeats gradual microevolution and intermittent macroevolution. Just as life evolved and new species were born, new products and new markets were created as a result of Disruptive Innovation. Finally, in terms of the conditions that cause evolution, Disruptive Innovation has taken place through rapid changes in technology and the market environment, such as the dawn of rapid changes in the natural environment. In this way, Disruptive Innovation in terms of survival environment, evolution process, evolution result, and evolution condition has been influenced by environment change such as customer (market) and has made intermittent macroevolution, new products and market have been created in the process, In the process, the DNA that was present when the product or service was first born did not change. In the process of evolving products and services, some attributes have been changed to new attributes as the attributes of customers (market) have been improved. However, since the origins of products and services have not changed, It is not appropriate to call it Disruptive Innovation. In this

regard, we will define this Innovation theory, called Disruptive Innovation, as Multiplier Innovation. As a result of genetic substitution through DNA extraction and environmental factor extraction of PDA, it is necessary to maintain the DNA of the existing PDA and to provide the new customer value. , It has become an innovative product that can provide a completely different customer value than existing products. This is also more Multiplier than Disruptive because existing DNA has been maintained and applied new environmental condition factors to create new customer value. Therefore, we can now apply Disruptive Innovation as Multiplier Innovation to understand how to create new customer value continuously in customer (market) environment where products and services belong. In addition, Multiplier Innovation fosters convergence of technology DNA to attract new industries and make continuous Innovation possible. In this way, we are looking for ways to contribute to start-up based on innovative technologies.

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Figure 1. Process of Multiplier Innovation

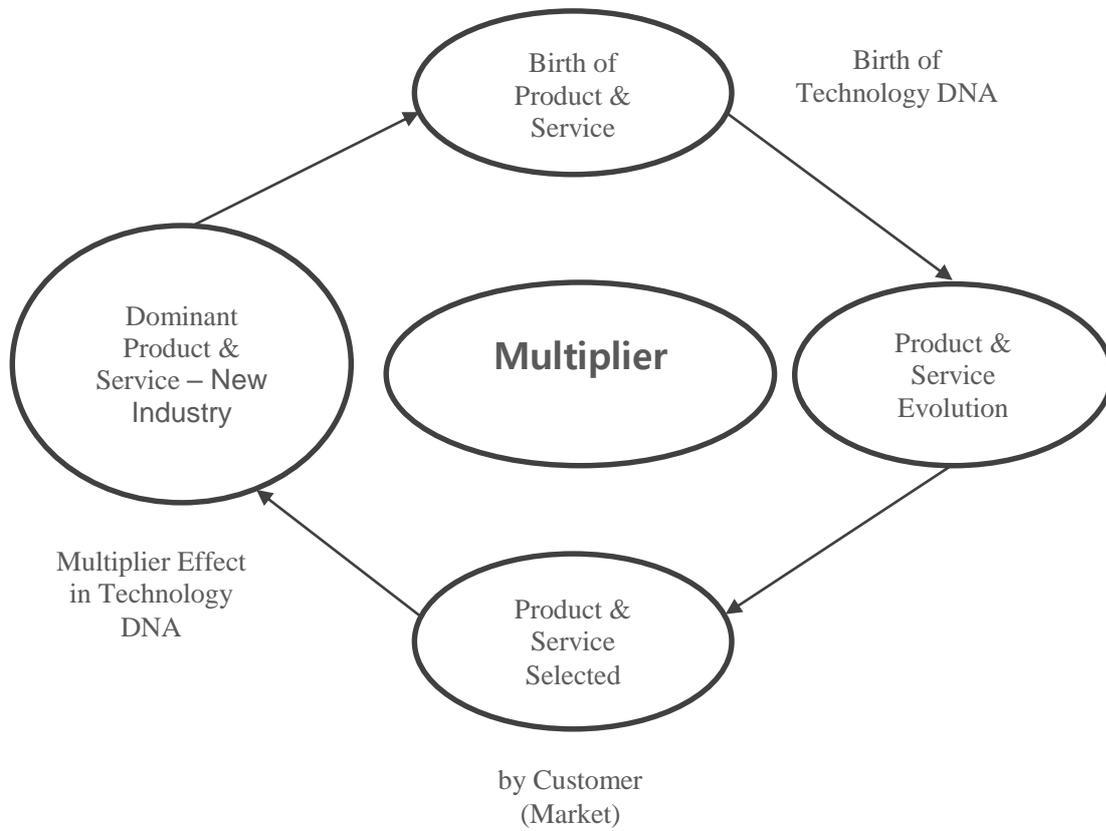


Table 1. Criticism of Disruptive Innovation

Author	Explanations
Gulati and Garino (2000)	Barnes & Noble decided to establish a completely separate division (barnesandnoble.com) for online retailing, giving up the synergy of purchasing, information sharing, branding, cross-promotion and customer service.
Iansiti et al.(2002)	Existing retailers that integrate business and web operations are more efficient at generating revenue than retailers who maintain in the autonomous sector
McDermott and O'Connor (2002)	Isolation can protect a project from adverse effects in the mainstream, but it shrinks the project from the most important source of learning, capacity and resources.
Markides and Constantinos (2006)	The new business model is not necessarily superior to the business model established by the company. In fact, it is not necessarily the best strategy for an existing company to give up its existing business model and prefer a new one, or to grow a new model with an existing business.
Markides et al. (2005)	Existing companies should not attempt such Innovation, but small start-up companies with the necessary skills and attitudes to succeed in this game should create this kind of market. The established firm should focus instead on integrating the young market into a massive mass market.
Tellis (2006)	The technology does not evolve along the S-curve, does not cross performance once, and does not always start or end before the previous technology level. Rather, the performance path of a competing technology may follow irregular step functions, never intersect, or intersect multiple times.
Lepore (2014)	Disruptive Innovation does not work as advertised when switching from specialty steel manufacturing to educational services, and does not work well when applied to manufacturing. Crucially, sustained Innovation recognized by Christensen's theory is much more successful.
Peter and Blake (2014)	If start-ups are tied to Disruptive Innovation, it's easy to get in the way of obstacles just before your eyes to offset the dominance of your existing market. Disruptive Innovation is not the view of a new company, but the view of existing companies. Therefore, it can't be said that the position against the existing companies is necessarily new.
Takashi (2011)	In the 1990s, as the main consumer of DRAM moved from large PCs to general PCs, Japan, which had the largest share of the DRAM market for large PCs, ranked first in Korea, which was optimized for mass production of DRAMs for PCs. What is required for PC DRAM is low cost and small size, high quality

	and long-term guarantee required for large PCs has not satisfied demand.
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Table 2. Mutual coherence of evolutionary theory and Disruptive Innovation

	Theory of Evolution	Disruptive Innovation
Subject	nature	Enterprise
Object	Life	Products, Services
Survival Environment	nature	Customer (Market)
Process	Gradual, intermittent	Persistent, Disruptive
Evolutionary Condition	Natural environment change	Technology, Market Environment Change
Evolutionary Result	The birth of a new species	New product, market birth

Table 3. DNA extraction

	DNA extraction			
	PDA	-> NEW PDA	-> Black Berry	-> Smart Phone
Fundamental attribute	Information input device Software (OS) Modem (Connector) Power (battery) Memory	Information input device Software (OS) Modem (Connector) Power (battery)	Information input device Software (OS) Modem (Connector) Power (battery) Memory	Information input device Software (OS) Modem (Connector) Power (battery) Memory

		Memory		
Improved Attributes	none(origin)	Speed improvement Functional simplification Low-cost strategy Electronic pen	Fast wireless internet User-to-user networking QWERTY Keyboard	Stylish Design Large, clear touch screen high quality Taking pictures and videos Download music, video, game data Fingerprint, iris, facial recognition Electronic financial transaction

Table 4. Environmental condition factor

	Environmental condition factor																			
	Technical factors					Other Product Elements							Customer awareness space factor							
Element	V	I	W	P		B	B	X	F	T	U	P		L			C	C		
Attribute	O	N	I	H		A	L	I	O	A	L	R	B	I	N		O	U		
s	I	F	R	O		T	A	A	L	B	T	O	E	F	E	J	U	L	S	A
	C	O	E	T	O	T	C	O	D	L	R	F	A	E	E	O	N	T	E	G
	E	R	L	O		E	K	M	E	E	A	E	T	S	D	B	T	U	X	E
		M	E			R	B	I	R	T		S	S	T	S		R	R		
	C	A	S	S		Y	E				B	S		Y		Y	E			

or)																			
Power (Battery)							√												
Memory															√				

Table 5. Genetic Substitution

	Genetic Substitution						
Technical Factors	Voice Call	Information Input Output Save	Wireless Communication	Photo Shooting	OS	Memory	Battery
Other	Black Berry	Xiaomi Battery	Folder Phone	Tablet PC	Ultra Book Net Nook	Professional Camera	Beats by Dr. Dre
Product Elements	QUERTY Keyboard (Physical Board)	Large Capacity Battery	Folding (Vintage) Design	Relatively Large Screen	Lightweight Multifunction High Performance	High Quality Multifunction	High Quality Sound Sensational Design
Customer Awareness	Lifestyle	Needs	Job	Country	Culture	Sex	Age

Space							
Factor							

Table 6. Success cases of Disruptive Innovation

TYPE	Number of patents of Existing products (based on Kipris)	Number of patents for Disruptive products (based on Kipris)
<p>'Hearing Aid'</p> <p>H04R 25/00 H04R 1/02</p>	<p>'Original Hearing Aid'</p> <p>(2,020 registered patents)</p>	<p>DELIGHT</p> <p>'Hearing Aid'</p> <p>(2 registered patents)</p>
<p>'Indoor Tent'</p> <p>E04H 15/10 E04H 15/00</p>	<p>'Original Indoor Tent'</p> <p>(566 registered patents)</p>	<p>BY MOM</p> <p>'Indoor Tent'</p> <p>(1 registered patents)</p>
<p>'Electric Driver'</p> <p>B25B 23/147 B25B 23/18</p> <p>B25B 21/00 B25B 23/00</p>	<p>'Original Electric Driver'</p> <p>(1,572 registered patents)</p>	<p>THE HIVE</p> <p>'Electric Driver'</p> <p>(1 registered patents)</p>
<p>'Shampoo (ingredient extraction method)'</p> <p>A61K 36/81 A61K 9/20 A23L 5/20 A23L 17/60</p> <p>B01J 2/06 B01J 19/18 A61K 8/97 A61K 31/01</p> <p>A61Q 19/00 C12P 23/00 A61K 36/03 A61K 36/899 A61P 9/12 A61K 9/22</p>	<p>'Original Shampoo (ingredient extraction method)'</p> <p>(3,669 registered patents)</p>	<p>ECOMINE</p> <p>'Hair Loss Prevention Shampoo'</p> <p>(10 registered patents)</p>
<p>'Air Freshener'</p> <p>A61L 9/12</p>	<p>'Original Air Freshener'</p> <p>(7,350 registered patents)</p>	<p>PIUM LABS</p> <p>'Smart Defuser'</p> <p>(1 registered patents)</p>
<p>'Piping Loosening Prevention Technology'</p> <p>F16L 19/02 F16L 55/00 F16L 15/08 F16L 33/24</p>	<p>'Original Piping Loosening Prevention</p>	<p>SSOLLOCK</p> <p>'Piping loosening lock, Fitting</p>

F16K 27/12 F16L 27/02 F16L 33/24 F16L 19/02	Technology' (New Market Creation)	loosening prevention hole' (4 registered patents)
'Cosmetics (raw material manufacturing method)' C07K 1/00 C07K 1/12	'Original Cosmetics (raw material manufacturing method)' (16,907 registered patents)	MARIN TECHNO 'Marine Collagen Cosmetics' (1 registered patents)
'Wearable Device (program)' G02B 27/01 G03B 17/00 G06K 17/00 G06K 19/06 G08G 1/005 G08B 21/02 G08B 25/10 G06F 21/31 G06F 21/32 G02B 27/02	'Original Wearable Device (program)' (1,183 registered patents)	NEXSYS 'Wearable Device Utilizing Video Transmission Device, System' (7 registered patents)
'Bluetooth (sound wave communication)' H04W 12/06 H04W 4/00 H04L 9/32 H04L 29/06 G06F 3/16 G06F 3/01 G06Q 50/10 H04B 11/00 G06Q 50/10 G06Q 30/02 G06K 17/00 G01S 3/80 G06Q 20/38	'Original Bluetooth (sound wave communication)' (23,826 registered patents)	PERPLES 'SoundTAG(sound wave communication technology), BLE (Bluetooth Low Energy technology)' (9 registered patents)
'Wearable Device (Biometric)' A61B 5/11 A61B 5/00 G06F 21/32 H04W 2/06 G06F 3/01	'Original Wearable Device (Biometric)' (1,183 registered patents)	ZIKTO 'Wearable band arki, Biometrics / Authentication method' (7 registered patents)

Figure 2. New Industries Emerge through Technical DNA and Multiplier Innovation

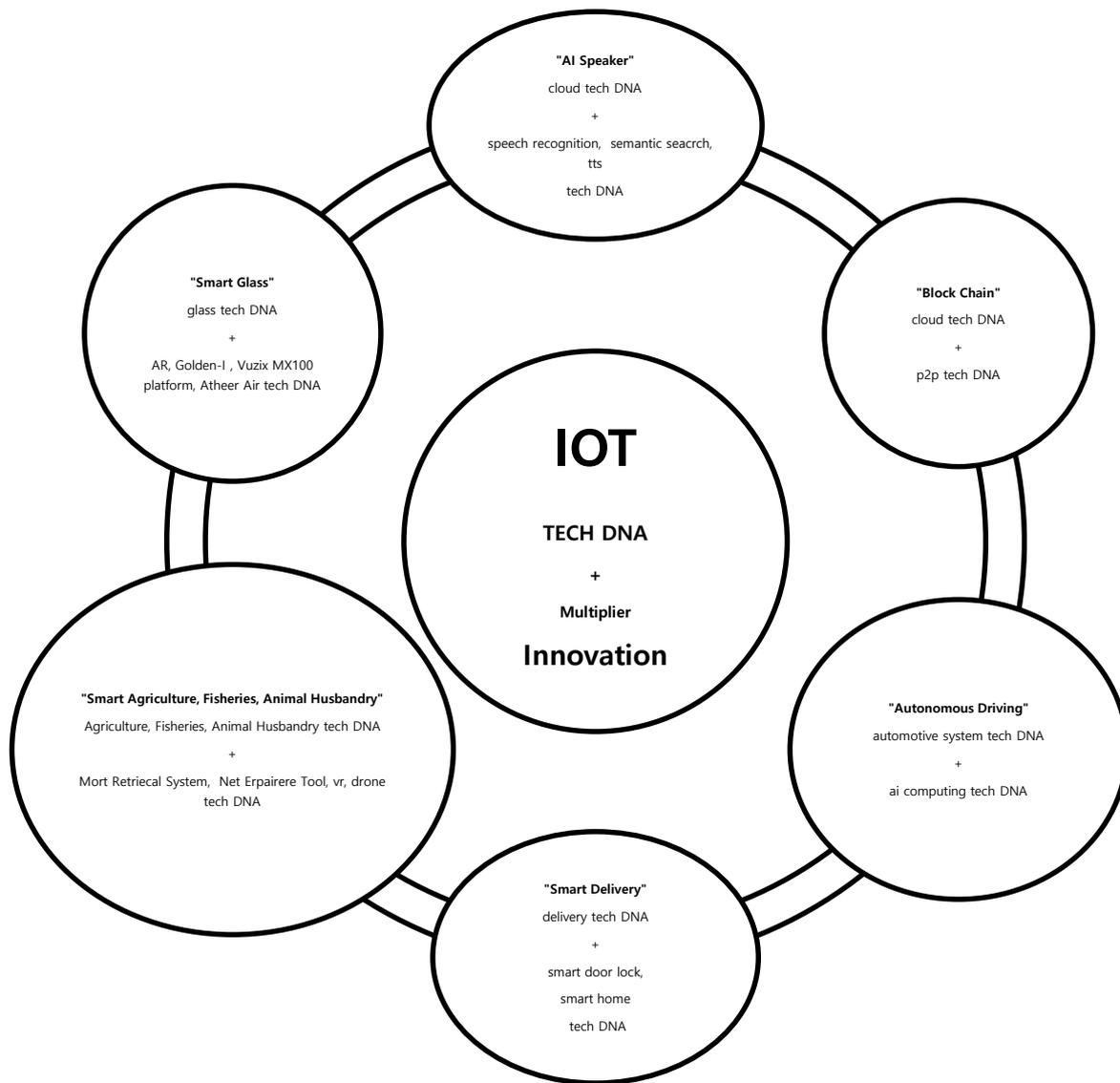


Table 7. Technology ripple effect through Multiplier Innovation

	Fusion Technology
--	--------------------------

Technology DNA	speech recognition, semantic seacrch, tech DNA	p2p tech DNA	AI computing tech DNA	Smart door lock, smart home tech DNA	Mort Retrieical System, Net Erpairere Tool, vr, drone tech DNA	AR, Golden-I , Vuzix MX100 platform, Atheer Air tech DNA
Amazon(1)	X 3					
BlockChain(1)		X2				
Autonomous Driving(1)			X2			
Smart Delivery(1)				X3		
Agriculture, Fisheries, Animal Husbandry(3)					X12	
Glasses Technology(1)						X3

Does the Patent become a proxy of the firm's market value?

Case of South Korea

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Abstract

This paper empirically explores patents as indicator of market future valuation of the firm. Although the patent counts as a proxy for R&D success is relatively limited by the very large variance in the significance or value of individual patents, rendering patent counts an extremely noisy indicator of R&D success, number of patents shows representative of the firm's innovation activity. If patents contribute positively or negatively to the firm's future market valuation, stock price as a proxy of market value shows the similar pattern according to each firm's patent activity and intensity. This implies that a firm's R&D investments should be capitalized in the firm's market value. In order to analyze, we utilize the patents data comprised 464 firms each 14 industrial sectors, collected and gathered from KISVALUE, released by Korea Intellectual Property Office. From the findings, this paper shows fruitful results. First, on firm side, patents have an important role to give a positive signal of their firm's value for investors and customer. Second, market side, each firm's research productivity (intellectual property rights) shows the indicator of future market value of the firm.

Keywords: Intellectual property rights, Patent, Stock price, Market value

1. Introduction

R&D investments create “intangible” capital, and this affects the valuation and reputation of the firm by the investors and customers. Intellectual property rights (hereafter, IP) is the representatives of the intangible assets. For firms, it is a strategical blueprint for turning firm knowledge, know-how, and patent into a sustainable competitive weapon that could build a firm's reputation and market share (Patrick, 2000). Value driven IP strategy has become firm's survival and growth. Although IP do not exact predict the future's market values, it is possible that IP can role to foresee that how a firm can be survival and successful in the market. Recently more firms have been exploited patents as potent competitiveness weapons and as a source of unexpected resources. In the same contexts, particular, patents enable firms to defend a proprietary market advantage. That is their most powerful benefit. If we figure out the hidden power of patents in terms of the indicator of firms' future market value, firms more easy to find the managerial and technical research and development (R&D) strategy in volatile competitiveness market environments in the world.

In that reasons, the purpose of this article is to find that whether patents are related with stock price as a proxy for firms' market values, and whether the difference pattern of fluctuation could exist according to the firms' characteristics. In order to find our research goal, we deal with patents as an independent variable because patents (exchange able intellectual property) are actually one type of intellectual property and legally protected intellectual assets. Patents can significantly enhance a firm's success in three broad ways: by establishing a proprietary market advantage, by improving financial performance, and by enhancing overall competitiveness. Patents can significantly enhance a firm's success in three broad ways: by establishing a proprietary market advantage, by improving financial performance, and by enhancing overall competitiveness. Also Patents can help firms communicate their asset picture and earning potential to investors and the financial community (Rivette, and Cline, 2000). And they have a great effect on commercial success and market value of company recently. We utilize the each firm's stock price as a dependent variable because it is likely to be sensitive and adaptability according to the firms' R&D intensity and performances. Typically, stock market change every day as

a result of market forces. Thus, if more people want to buy a stock than the price moves up, conversely, stock market also operated. Although, we are difficult to understand is what makes people like a particular stock and dislike another stock, this comes down to figuring out what news is positive for a company and what news is negative. There are many answers to this problem. The value of a firm is its market capitalization, which is the stock price multiplied by the number of shares outstanding.

To fulfill our research purpose, we propose two hypotheses as follows: Proposition 1: There will be a time lag between company's intellectual property activities and stock prices as market response. Proposition 2: Company's intellectual property activities and stock prices as market response will have a fluctuations of similar pattern over time. We utilize the patents data set comprised 464 firms each 14 industrial sectors, collected and gathered from KISVALUE, released by Korea Intellectual Property Office to empirical analysis. We get meaningful research outputs. First, on firm side, patents have an important role to give a positive signal of their firm's value for investors and customer. Second, market side, each firm's research and development intensity shows the indicator of future value of the firm. Academically, this paper also contributes to further study with regards to intellectual property rights' value. This paper is organized as follows. Section 2 presents a review of the literature on R&D activities and firm's value. Section 3 describes the data set and empirical analysis and the empirical analysis. Section 4 shows research model and hypothesis. Finally in the section 5, we can conclude the research results and discuss implications.

2. R&D activities and value of the firm

The firms innovate in order to preempt a competitive advantage in the market. To do this, it is reliable source for innovation that companies conduct research and development on its own. R&D is divided into research and development. Development means the activity for the application, such as the efficiency of the manufacturing process or performance improvement, improving the performance of existing products in the market. Research can be classified into basic and applied research. Basic

research is to get the basic knowledge about observed facts or phenomena and to improve the understanding of a field of study. Applied research is to improve the understanding of the subject in order to meet a demand for specific objectives (Schilling, 2005).

Firms may have monopoly power and stability that can hold a variety of business opportunities by internalizing R&D in the form of patents (Schumpeter, 1950). However, depending on factors such as the volatile market, rapidly changing technology, and unpredictable technologies, firms are also faced with uncertainty. Therefore, when companies are considering whether to undertake R&D projects, they consider the costs and benefits of the projects.

Companies that invested significant funds in R&D projects are more likely to find opportunities than others that do not invest. On the other hand, because of huge funding that continuously invested by firms, companies are often difficult to avoid the risk (Mansfield, 1968). This situation is related to the characteristics of R&D that has generated outcomes after long-term investment. Thus, as investing capital in R&D, estimates of the profits occurred in future are generally small than budget of the cost of investing in tangible assets, marketing. Especially, the sensitive industries such as steel, oil and paper making industries are profitable when market conditions are good. In this case, these industries' companies that invest huge capital in R&D may not be able to fully utilize funds to raise private equity when the market condition is good. Therefore corporate profitability and investment in R&D may be an inverse relationship in this case (Branch, 1974).

That is, R&D provides corporates with substantial benefits and the risk of uncertainty at the same time. Furthermore, the corporate is a difference in the degree of the driver for R&D in accordance with the technical characteristics of industry. In contrast, the industry that changes slowly doesn't have enough drivers to invest R&D (Branch, 1974).

Nevertheless, in a variety of studies, researcher has found that investment in R&D affect the market value of a company (Branch, 1974; Grabowski and Mueller, 1978; Baek, 1994; Choi, 1994). The researchers analyzed the effect of R&D cost on corporate value and founded that there is a positive

correlation. In particular, patents have been used in various studies as a quantitative variable that can affect corporate value.

In research on relationship between initial performance of patents and financial performance indicators of the firm, it is difficult to identify the variables and indicators that how and when performance depending on original activities created. Therefore, in previous research, it is difficult to understand that a clear relationship between the economically meaningful outcomes and results of creative activities such as applying for a patent (Pakes, 1985). Thus, it increased the need for research on effects between corporates performance and R&D activities.

3. Empirical studies utilizing patents and corporate performance as variables

According to the Korea Institute for Industrial Economics and Trade's According to the small businesses Innovation and Impact Factors Analysis and Policy Issues Research Report, many studies relating to the factors of firm's technology innovation use R&D investment or human resources as an independent variable and as a dependent variable various variables include the number of patents and R&D intensity. In other words, it utilizes a patented as an objective indicator of performance through research and development activities of the company. In particular, this study focused on firm's c intellectual property activities. Therefore, < Table 1 > is summarized about contents of utilizing the patent as variables related to firm performance previous studies.

< Table 1 > The Summary of Empirical Studies

No.	Researcher	Subject	Independent variable	Dependent variable	Result	Note
1.	Scherer (1965)	352 firm in Fortune 500	Sales, Yield	Number of registered patents	Positive Correlation between the count of patent registration and sales growth	

2.	Comanor and Scherer (1969)	57 pharmaceutical companies	Number of R&D employees	Sales, Number of registered patents, Number of new products	Positive correlation between the number of R&D employees and number of registered patents, number of new products	Number of R&D employees involve professional researcher and research assistant
3.	Branch (1974)	111 firms	Number of registered patents, R&D cost	Yield	R&D activities are affected in the prior yield and affect the future yield	
4.	Griliches (1981)	157 firms	Number of registered patents, R&D cost, Market value	Taking the log of Tobin Q value	Positive correlation between number of registered patents and market value and R&D cost	
5.	Pakes (1981)	120 firms	Number of registered patents, R&D cost	Price earnings ratio	Positive correlation between R&D cost , changes of patent application number and stock market evaluation	According to patent registration, there are stock-market value fluctuations in 5%
6.	Cockburn and Griliches (1988)	722 firms	R&D cost, R&D net investments	Taking the log of Tobin Q value	In an industry which is effective patent protection, The patent value is highly evaluated.	
7.	Narin et al. (1987)	17 Pharmaceutical companies	Number of registered patents, Forward citation	Financial performance	Positive correlation between forward citation and financial performance	
8.	Chaney and Devinney (1992)	Companies who developed New Product in 1975 ~88	Patent index per employee	Profitability	Positive correlation between number of patents per employee and profitability	Patent index involves patent registration or patent application
10.	Sung (2003)	337 Listed companies	Number of Employees (Firm size), Assets, Sales	R&D cost, Number of registered patents,	Positive correlation between firm size and R&D activity, Positive correlation between firm size and number of registered patents	R&D activity involve R&D cost and R&D intensity

11.	Park (2006)	162 High tech companies	Patent strength, R&D intensity, Intangible asset intensity	Net profit	Positive correlation between patent strength and R&D intensity
12.	Ahn (2010)	200 Venture companies	Number of registered patents, Patent score	Sales account, Net profit, ROA	Positive correlation between independent variables and sales , net profit
13.	Park et al. (2011)	169 companies	R&D intensity, Number of registered patents, Number of patents application	Market earnings ratio	Negative correlation between R&D intensity and earnings ratio, No relationship between number of patent and earnings ratio

Scherer (1965) analyzed the relationship between intellectual property and technological activities, opportunities, and company size as using data based on 352 firms of the fortune Top 500 list. This study used sales and returns to describe the size of firms as independent variables and patents data of US patent office in 1959 as dependent variables. Also, industry dummy variables were used to explain the distribution industry exists variously.

As a result, there are positive correlations between the companies' the number of the patents and the size of corporate. Opportunities in various technology aspects such as technical investment possibilities have no correlations with the company's sales scale.

Meanwhile, this study couldn't find that there are correlations between the results of intellectual activities representing the power of market dominance and variables such as earnings ratio, liquidity, and diversity of the product line.

Comanor and Scherer (1969) were based on previous study (Comanor, 1964). This study is analyzed the correlation of researchers that include Professional researchers and R&D staff, number of patents, sales account in the pharmaceutical industry companies in the United States that assist them. So this

study investigated the relationship between patents and technological change, Technical changes as a proxy variable that reflects the inputs that are committed to innovation processes, it used the new products sales account that can be the result of research and development personnel in the innovation process.

Branch (1974) looked three correlations that focused on may exist in the relationship between yield and R&D activities. First, profit affects the future R&D activities. Second, R&D affects the future profit. And profit and R&D affected same time by the third element. This study analyzed 111 companies in seven industries. Number of patents, R&D cost, profit were used as a variable for analyze correlation between profit and R&D activities. For looked at the effect of the time difference between the R&D intensity and profit in time series, it has used both cross-sectional data and time series data and the relationship between the average profit and R&D intensity has used cross-sectional data. Therefore, R&D activities are affected by historic profit and R&D activities will affect future profit.

Griliches (1981) was analyzed the correlation of R&D cost, number of patents, market value as a variable. It was multiplied by the market value coefficients reflecting the monopoly position and the risk of a comprehensive and market that was added intangible assets and type assets of companies is the current market value of the company. Based on this definition model, analyzed the correlation between variables. Therefore, corporate market value has positive correlation with R&D cost and number of patents.

Pakes (1985) focused on the causes and consequences of the company's creative activity. In prior studies, it was difficult to find the measuring indicators where and when the changes of inputs and/or outputs were generated because of the lack of company's intellectual property information. But this study utilized computerized patents data of the United States Patent Office. Through using this data, this research analyzed the correlation between the number of successful patents and R&D costs. In addition, this study investigated the relationships between patent applications and performance from the market. Therefore, it examined the relation among the number of patent applications, R&D costs, and price earnings ratio for 120 firms over the last eight years. As a result, the number of patent

applications and changes of the R&D costs have positive effect on evaluation of the firm. Also, there are approximately 5% of the stock market fluctuations in accordance with the patent application. This implies that there are correlations between corporate's intellectual property activities and market evaluation.

Cockburn and Griliches (1988) focused on evaluating the value of valuations in the equity market of the company's innovation activity. They analyzed the relative value of the market relative to the company's intangible and tangible assets. Based on a survey of prior research, there was a correlation between the measuring validity of the patents and market evaluation about company's previous intellectual property performance. However, because of the existence of different patent mechanisms among the industries, there were difficulties in measuring the data. That is, there were limitations about measuring which factors affect intellectual property performance among validity of the patent and efficiency of R&D. Thus, there is a little validity of the patents between industries.

Sung (2005) analyzed 337 listed companies in the manufacturing industry to identify the relationship between the company's size and technological innovation activities. To do this, he used the number of employees, sales and asset total as proxies for firm size and the number of patent applications, R&D costs as proxies for dependent variables. R&D costs typically uses least-squares method and the number of applied patents was estimated by using the logistics regression Analysis. As result, it had positive correlation with firm size and R&D costs, the number of patents. Especially, the higher the number of employees, sales and total asset, the higher the probability of applying for patents. This means larger size of company had more possibilities to apply for patent applications.

Park et al. (2006) analyzed the relationship between technological innovation and corporate performance by utilizing Korean patent information, based on a series of time frames and cross-section data. Considering the differences in industrial variables, they used R&D intensity variable, patent strength as proxies for technological innovation attributes and profitability as proxies for firm's performance. Given 1,782 observations of 162 domestic high-tech enterprises, they found that there are positive correlation with R&D intensity and patent strength. Based on this result, they looked at the

relationship between company performance and profitability. According to the analysis, the patent intensity had positive correlation with corporate performance. Especially, they had identified correlation between patent intensity that was cited as the number of domestic patents per 1,000 employees and Profitability as earned per employee. This means that patents based on R&D activities may represent technological innovative activities. As a result, researcher realized that could improve corporate performance. Thus, patents are an important element as a result of technological innovation.

Ahn (2010) focused of the company's patents capability was on the impact of the affected on managerial performance. Data listed of the top 200 venture companies in 2008 were analyzed using 5,098 observations of 138 companies such as the patent office and credit rating information. analyze the relationship between the company's patents and financial performance, The number of registered patents had positive affects the sales and net income. The grades of patents were positive correlated with sales and net income that showed relationship between the value of patents and financial performance. Through continued research and development activities, it was able to improve the company's performance through high technology value patent. There for company's R&D activities have led to financial growth.

Park et al. (2011) studied to see how the patents affect corporate performance in terms of management strategies and analyzed the relationship between patents, R&D concentration and stock yields. Based on the R&D investment trends data of the KIAT, they used small business corporate data in 2010. The stock price of 169 companies that listed in the KOSDAQ was set to research purpose. Thus, they used correlation analysis and multiple regression analysis to identify relationship between R&D intensity, the number of applied/registered patents, price earnings ratio, firm size, debt ratios. As a result of analysis, the intensity of R&D cost and price earnings ratio was correlated with negative correlation, and there was no significance relationship between patent and price earnings ratio.

In those prior studies, research and development costs were utilized as a result of research and development activities through research and development activities. Also, as an independent variable for corporate performance, it used patents and research costs. In addition, relationships with variable

value variables, such as variable value variables, are added to the company's values. Thus, existing studies stressed the importance of the relationship between intellectual property activity and market response.

4. Research design

Prior studies have usually analyzed the relationship between the company's R&D activities and performance or value of the corporate. Some studies have examined the relationship R&D activities and stock price or price earnings ratio as proxy of market value (Pakes, 1981; Kim et al., 1995; Park et al., 2011). According to the results, as announcement of patent application through the R&D activities influence market response evaluating the value of company, it causes fluctuations in the stock market.

Especially, Branch (1974) analyzed the effect of the number of patents in the company's accounting rate of return to examine the time-lag relationship between research and development costs and patents, profitability. As a result, the significance of the effects was identified between variables.

According to prior studies, there were no direct significance between the company performance and company's intellectual property activities. Therefore, we can expect to see a fluctuation in stock price as reacted by market after series of time-lag between intellectual property activities and company's performance. It may be possible that company's intellectual activities will perform a signal role for stock investors and it may affects corporate's stock price after time-lag. This means that the stock market response follows the intellectual property activities over time. Thus, it is expected that the pattern of intellectual property activities and fluctuations in stock prices will be shown in similar ways.

As noted previously, corporate's research and development activities involve gaps between necessity and motivation of R&D activities as industry's technical characteristics (Branch, 1974). So depending on the industry, aspects of fluctuations between intellectual property activities and stock price may be different. Therefore, this study set up the following research questions to analyze relationship between intellectual property activities and stock prices.

Proposition 1: There will be a time lag between company's intellectual property activities and stock

prices as market response.

Proposition 2: Company's intellectual property activities and stock prices as market response will have a fluctuations of similar pattern over time.

5. Research methodology

In this study, we utilized patents applications data and stock prices to examine the correlation between intellectual property activities and stock price fluctuations. In particular, we categorized the industries by applying the criteria of the Korean Standard Industry Classification (KSIC) to identify their differences.

As a proxy of the intellectual property activities, we used total number of registered patents and utility model rights in the 2014 statistical yearbook of intellectual property from 2010 to 2014. Also, to identify stock prices of each industry, we utilized the information of the company's stock prices belong to each industry of the Standard Industry Classification from 2010 to 2014.

Accordingly, we analyzed intellectual property activities and stock prices information from 464 corporates of the total 14 industries. Especially, in case of the sample of intellectual property activities, we used 66,433 patents and utility models in 2010 and 71,111 patents and utility models in 2011 and 74,948 patents and utility models in 2012 and 79,262 patents and utility models in 2013 and 81,747 patents and utility models in 2014. In the following < Table 2 >, we summarized the sample information.

< Table 2 > Data of The Sample⁴

Classification of the industry (KSIC)	The sum of patents and utility models (each year)					<i>The number of firms</i>
	2010	2011	2012	2013	2014	
Manufacture of Basic Chemicals	1,885	2,075	2,406	2,473	2,267	22
Manufacture of Cleaning Materials, Cosmetics and Polish	1,208	1,138	1,103	1,334	1,850	14
Manufacture of Other Chemical Products	2,587	2,855	2,855	3,277	3,631	36

⁴ Data: Korean Intellectual Property Office (2010-2014)

Manufacture of Man-Made Fibers	344	243	274	342	361	8
Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products	7,840	8,294	9,086	9,551	9,459	80
Manufacture of Rubber and Plastic Products	3,312	3,630	3,942	4,073	4,672	38
Manufacture of Other Non-metallic Mineral Products	5,512	5,769	6,198	6,365	6,749	31
Manufacture of Basic Iron and Steel	1,411	1,747	1,873	1,944	1,902	51
Manufacture of Fabricated Metal Products	2,711	2,905	3,222	3,177	3,054	35
Manufacture of Semiconductor	13,690	13,581	13,709	12,950	13,232	39
Manufacture of Electronic Components	6,014	6,161	5,438	5,829	5,654	74
Manufacture of Computers and Peripheral Equipment	4,112	4,378	5,149	5,926	5,903	8
Manufacture of Medical Appliances and instruments	5,782	6,304	6,625	6,994	8,220	10
Computer programming Services	10,025	12,031	13,068	15,027	14,793	18
Sum	66,433	71,111	74,948	79,262	81,747	464

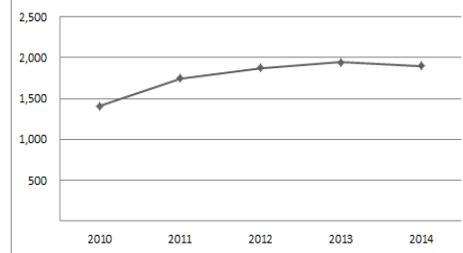
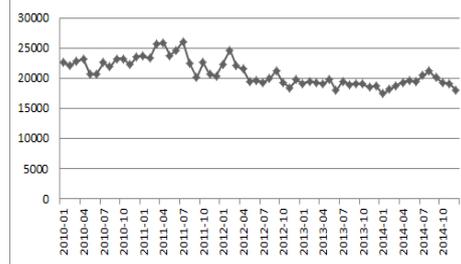
5. Results

Based on stock prices and intellectual property information of each industry, we except 1) companies whose stock price isn't announced, 2) companies those were not listed at that time. Meanwhile, because stock price is changed by days, it can't be used as annual information. Therefore, we used the average monthly stock prices as a proxy for stock fluctuations to do comparative analysis with intellectual property activities and the following <Table 3> show graphs. According to graph patterns, we analyzed correlations between intellectual property activities and stock fluctuations.

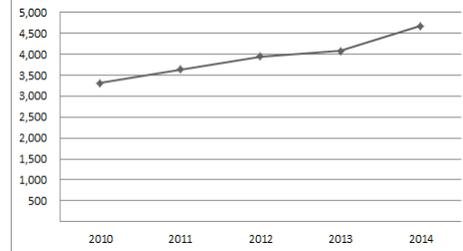
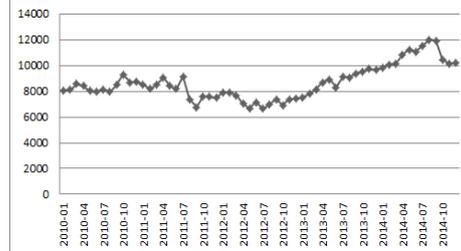
< Table 3 > Graph of Industrial Market Response and Intellectual Property Activity

Classification of the industry (KSIC)	Stock price	Patents and Utility model rights
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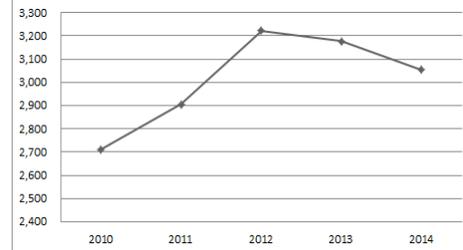
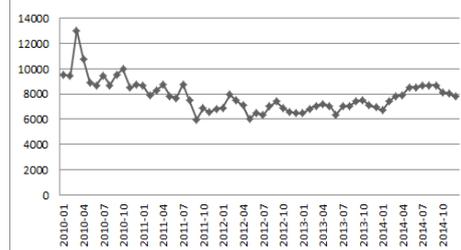
Manufacture of Basic Iron and Steel



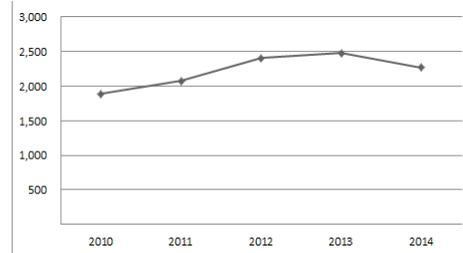
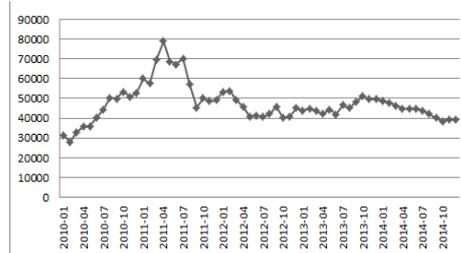
Manufacture of Rubber and Plastic Products



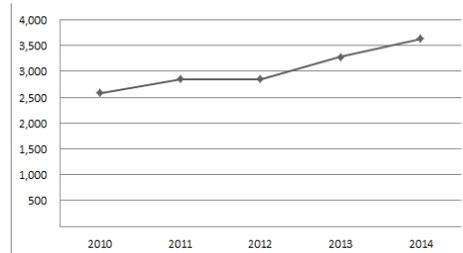
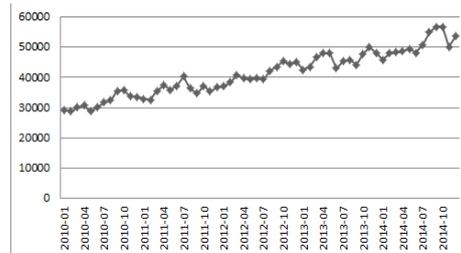
Manufacture of Fabricated Metal Products



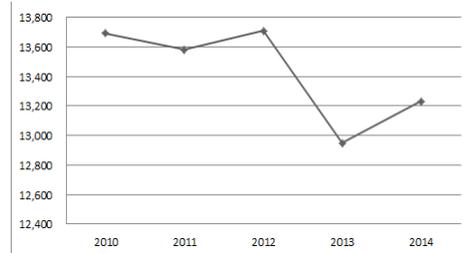
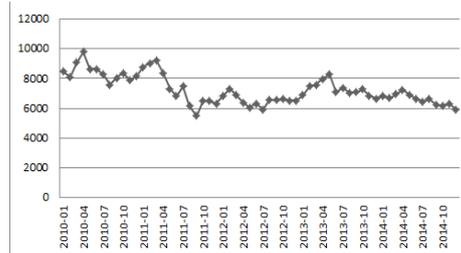
Manufacture of Basic Chemicals



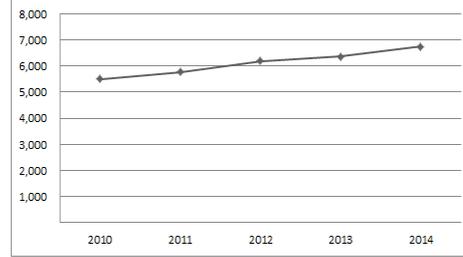
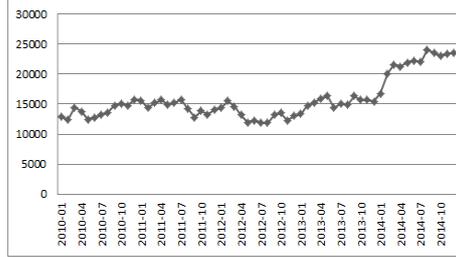
Manufacture of Other Chemical Products



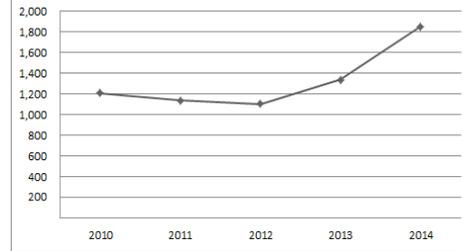
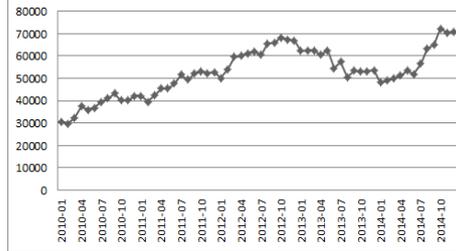
Manufacture of Semiconductor



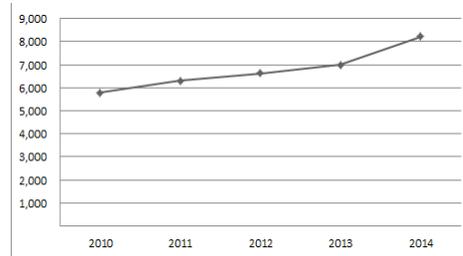
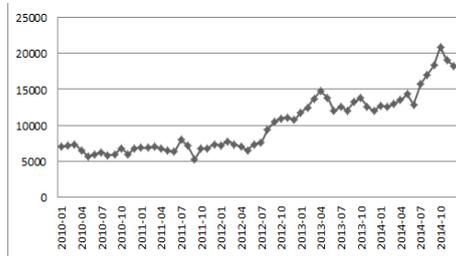
Manufacture of Other Non metallic Mineral Products



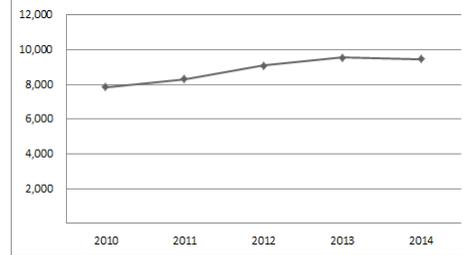
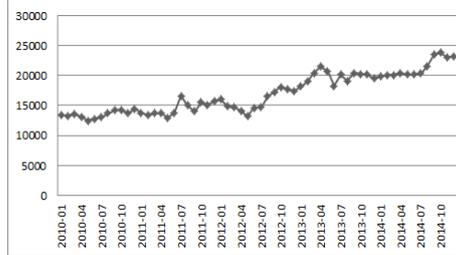
Manufacture of Cleaning Materials, Cosmetics and Polish



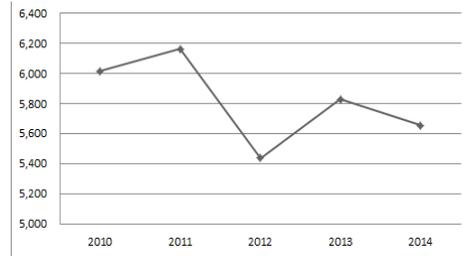
Manufacture of Medical Appliances and instruments



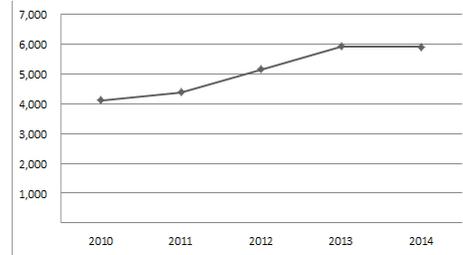
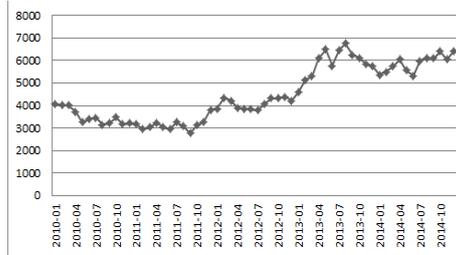
Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products



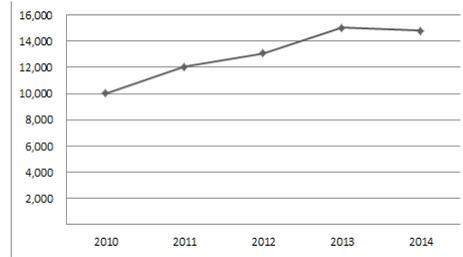
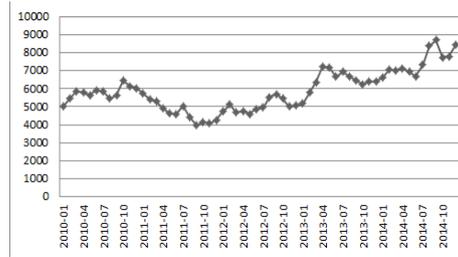
Manufacture of Electronic Components



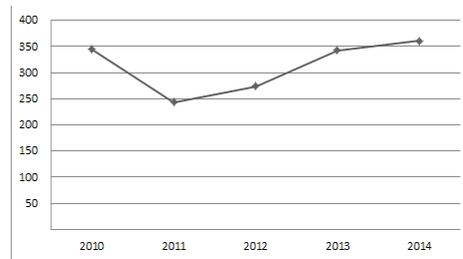
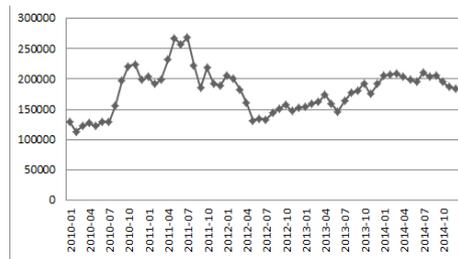
Manufacture of Computers and Peripheral Equipment



Computer programming
Services



Manufacture of Man-
Made Fibers



In the overall context of the graph, we found that industrial fluctuations of patent registration could be seen as similar to the average stock price's pattern.

On the other hand, in the case of the manufacture of fabricated metal products industry, there is a different degree of the pattern's similarity between intellectual property activities and market response graph. So, it is need to analyze patent trend of that industry. The manufacture of fabricated metal products is part of steel industry. Looking at the following < Table 4>, the number of registered patent in iron and steel industries has steadily increased from 2009 to 2013.

< Table 4 > The number of registered patents in steel and metal industries⁵

Year	2009	2010	2011	2012	2013
The number of registered patents	253	305	453	613	772

In a broad sense, the manufacture of fabricated metal products industry is included in the steel industry field. Therefore, this industry's patent trend followed steel and metal industries' one. In contrast, market response shows a steady graph than increasing. This means that the manufacture of fabricated metal products industry follows stock market trends of the steel and metal industries that are typically cyclical

^{2,3} Data: Korean Intellectual Property Office

industry.

Given the industrial trend of steel in the Korea Iron and Steel Association and Korea National Indicator System, since the oversupply of steel from 2000s, the profitability of domestic large firms has been steadily declining. Also, as expanding the inflows of China's steel products, the competition for various steel industries has intensified. As a result, the market response graph of the manufacture of fabricated metal products industry is seemed to have stable pattern, despite of increasing intellectual property activities.

In the case of the manufacture of semiconductor industry, it is subordinate industry that belongs to the manufacture of electronic components, computer, radio, television and communication equipment and apparatuses industry in the criteria of the Korean Standard Industry Classification (KSIC). Looking at the following < Table 5>, although this industry has the largest number of industrial registered patents in the past decade among industries analyzed in this study, the growth rate of patent applications for the past 10 years has declined to minus 0.4 percent.

< Table 5 > The number of registered patents in electronic components, computer, radio, television and communication equipment and apparatuses industry³

Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
The number of registered patents	18,007	33,838	30,804	15,846	8,744	10,133	14,286	14,340	15,066	15,285

Especially, among the registered patent ratios for each technological field of the manufacture of electronic components, computer, radio, television and communication equipment and apparatuses industry, patent ratio of the semiconductor industry was the highest with 22 percent in 2005. However, the ratio of patents in semiconductor industry dropped to 10 percent in 2014. This means that while the number of registered patents has increased sharply from 2005 to 2010 in accordance with trend of the global market, as the technological diversity has occurred since 2010, the semiconductor industry's patents has been reduced substantially. In other words, we found that the number of patents in semiconductor industry has decreased, as company's technology focusing sector in this industry has

been diversified.

In case of the manufacture of basic chemicals, we found that sharp fluctuations of the stock price have occurred from October 2011 to November 2011. It reflects domestic manufacture of basic chemicals related industry' market conditions affected by LG chemicals that largely invested projects related to electric car batteries, as response to global large firm's investment activities such as GE, GM, etc. In addition, forecasts data of lithium ion battery market and sales goals for electric cars from LG Chemical in 2011 reported that this market may grow to around \$141 million. Therefore, LG chemicals held a factory completion ceremony in 2011. That is, the pattern of the above graph appears to have reacted sensitively to the trend of the global market to prepare the Electric Vehicle Market in 2011.

As a result of analyzing intellectual property activities and fluctuations of stock prices by year and industry, the both types of graph in most industries changed in similar pattern. In case of abnormal variation in graph, it has been identified by environmental conditions and events, which can affect stock prices hugely.

6. Conclusions and implications

This study analyzed 464 firms that could be identified about stock price data from 2010 to 2014 by utilizing information of database program named 'KISVALUE'. We used the number of patents and utility model in 2014 statistical yearbook of intellectual property from 2010 to 2014 to measure firm's intellectual property activities and utilized stock price data from KISVALUE to examine market response. Consequently, we analyzed the relationship between intellectual property activities of the firm and market response. And then, according to industrial characteristics, we identified each fluctuation aspect of these two factors.

According to various prior studies, the company's intellectual property activity was measured by the number of patents, and in this study, we used sum of patents and utility model rights. Especially, the utility model right is comprised in result of intellectual property activity, because it is an idea of the shape, structure, or combination of available goods. Furthermore, we examined whether industrial

differences are existed, or not in intellectual property activity and stock response.

This research provides the following analysis results. First, the graph of intellectual property and fluctuations of stock price have a similar variation and shape, but differed depending on industries. Unlike prior research, this study analyzed the fluctuations of the stock prices based on industrial characteristics. As a result, we found that graph of intellectual property activity and changes of stock price have similar variation and pattern in most industries. This means that a variation of stock price, as a proxy of market response, and the number of intellectual property, as a proxy of performance of R&D, have similar fluctuations. Therefore, the active R&D activity of the firm may become positive investment signal from the market.

In addition, the graphs have different variation in each industry and there were significant variation of the intellectual property activity graph and stock price average one in particular sectors of some industries. Based on the case analysis of each industrial issue, there are major events or market trends between each industry's significant fluctuations. It means that this variation has been affected by external environmental events or global market trends. In conclusion, firms may receive positive feedback from the stock market by reacting to the changes of market environment, technology, or industrial characteristics, as doing actively research and development activity to hold intellectual property rights. Moreover, based on the positive assessment of the market, companies strategically can manage and R&D to have a competitive advantages.

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A Study on the Effect of Using Innovation Methodology on Employee's Innovation DNA Development and Corporate Performance

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Abstract

Purpose/ Research Question:

This study examined the positive effects of Innovation Methodology (6-sigma and Design Thinking) on the development of employees' innovation DNA, innovation performance, and business performance, and also verified the effects of success factors of 6-sigma and characteristics of Design Thinking on the business performance with the mediation of employee's innovation DNA.

Key Literature Reviews (About 3~5 papers):

Dyer, J., H., Gregersen, H. B., and Christensen, C. M. (2011), 『The innovator's DNA: Mastering the five skills of disruptive innovators』, Harvard Business School Press Books.

Antony, J. and Banuelas, R. (2002), 「Critical success factors for the successful implementation of Six-Sigma projects in organization」, 『The TQM Magazine』, 14(2), 92-99.

Brown, T. (2008). 「Design thinking」, 『Harvard Business Review』, June. 2008. Harvard Business School Publishing Corporation.

Design/ Methodology/ Approach:

We described literature reviews about success factors of 6-sigma and Design Thinking and innovation DNA. We suggested four hypotheses that were drawn from the previous researches. To verify these hypotheses, collected the data and were tested by validity, reliability, correlation and structural equation model analysis.

(Expected) Findings/Results:

This study found that success factors of 6 sigma had positive effects on employees' innovation DNA development. And it was confirmed that success factors of 6-sigma had positive effect the innovation and business performance with the mediation of discovery DNA. However, the success factors of 6-sigma had positive effects on the development of employees' practice DNA while they had no effects on the innovation performance with the mediation of practice DNA.

In the case of design thinking methodology, we have identified the effect of the characteristics of design thinking on innovation DNA development and corporate performance. As a result, the characteristics of design thinking showed a very strong causal relationship with the innovation DNA. However, the mediating effect of the innovation performance was not identified, and unlike the Six Sigma success factors, the characteristics of design thinking showed a strong positive (+) effect directly on the Business performance.

Research limitations/ Implications:

This study empirically assessed that employee's innovation DNA could be developed through innovation methodology, which could be linked to innovation performance of company.

Keywords: Innovation Methodology, 6 Sigma, Design Thinking, Innovation DNA, Innovation performance, Business performance

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**Performance and Technology Commercialization According to Technology
Development Capacity of SMEs Focusing on Comparative Analysis of
Technology Business Groups**

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Abstract

Purpose/ Research Question:

Accordingly, the objective of this research is to investigate the influential factors on performance by suggesting technological development results and technology commercialization as the outcome of technological development capacity and identifying the capacity required for successful technological development performance and technology commercialization for companies through academic preceding research. Moreover, the study aims to investigate performance differences according to technology business groups by dividing the groups into high-technology companies, mid-technology companies and universal-technology companies.

Key Literature Reviews (About 3~5 papers):

Recently, a lot of small and mid-sized enterprises have emerged through continuous technological development and start-up successes in spite of insufficient scales and resources compared to medium enterprises or conglomerates in the fierce competition of the market. Technological development capacity that is required to acquire, select or utilize source technology for company competitiveness becomes the competitive edge and key capacity to have distinctiveness.

Design/ Methodology/ Approach:

In this study, we set two dependent variables as the achievement of technology development capability and technology development achievement. In detail, we considered technology competitiveness, which means whether we have entered into new business field from technology development achievement, and product competitiveness, which means improvement of product

quality and performance. As an independent variable, technology development capacity was used for analysis. First, technology development personnel are divided into researchers and research assistants who are engaged in research and development activities. In other words, research and development personnel are set up. Second, technology and R & The third is the presence of a dedicated research institute for technology development, and finally, the level of technical ability (new technology development ability, development technology commercialization ability).

In this study, statistical package program STATA 12.0 was used for empirical analysis to verify the research hypothesis. Basic descriptive statistical analysis was conducted to analyze the characteristics of survey data. In addition, correlation analysis, multiple regression analysis, and logistic regression analysis were conducted to verify the effect of technology development capacity on technological development performance and technological performance.

(Expected) Findings/Results:

As a result of the analysis, among indicators constituting technological development capacity, manpower in technological development and technological development-specialized research centers had positive influence on product competitiveness of technological development performance. Also, technological development expenses and technology capacity levels were verified to have positive impacts on technology competitiveness of technological development performance. As for technology commercialization performance, the more the manpower in research and development, the higher the sales amounts by technological development; also, the higher the technology capacity levels, the higher the export amounts by technological development. Moreover, technology business groups had differences in performance.

Research limitations/ Implications:

Future research is expected to draw new variations different from the analysis results from existing studies by setting variations, investigating complementary relationships among variations in detail and utilizing statistical techniques that can control mutual relationships among variations.

Keywords:

small and mid-sized enterprises, technological development capacity, technological development performance, technology commercialization, technology business groups

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A Study on the Customer Churning Behavior according to the Market Maturity of Innovative Convergence Service : Focusing on the IPTV service.

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Abstract

Purpose/ Research Question

In this study, we analyzed the factors influencing the customer withdrawal behavior of IPTV service. We divide IPTV service users into mainstream and early maturity markets to see how they differ in consumer behavior and customer churning. This study suggests key success factors that can be applied to high-tech based innovation convergence services.

Key Literature Reviews (About 3~5 papers)

Previous studies on IPTV contents have been reviewed in terms of content usage, content quality, and content optimization (Blasco-Arcas et al., 2012; Lin et al., 2014).

Research on switching barriers has been analyzed to determine the impact on customer loyalty in relation to customer satisfaction (Kim, K. H., Chun, J. h., 2015; Zhang et al., 2014).

VoC has been emphasized as a way to understand customer complaints, and studies on VoC have mainly analyzed the impact on customer loyalty and customer satisfaction. (Choi, H., Kim, Y., and Kim, J., 2010; Ministry of Science and ICT, 2018).

Customer deviations can be divided into studies that are interested in the causes of deviations and research that suggests or predicts customer deviations (Hejazinia and Kazemi, 2014; Kisioglu and Topcu, 2011; Oghojafor et al., 2012; Wong, 2011; Ministry of Science and ICT, 2018).

Design/ Methodology/ Approach: Based on the review of current literature, a research model is introduced to depict the effects of select independent variables on customer churning behaviour. The data used in this study consisted of the web log of IPTV service users for the final 3,340 users. In addition, we examined the hypotheses by analyzing the factors affecting the relationship with

the departure of customers by deriving the variables related to the conversion barriers, content usage and consumer behavior of the IPTV service derived through previous studies.

The analysis procedure is as follows: First, basic statistical distribution of the basic characteristics distribution of the service users' web logs is analyzed. Second, multiple regression analysis is used as an estimation equation for the effect of the IPTV service switching barriers and content usage on consumer behavior. Respectively. Third, logistic analysis was used to predict the probability of departure of Web log values related to conversion barriers, content usage, and consumer behavior.

(Expected) Findings/Results: The empirical results of this study are as follows: First, it shows that the increase of membership benefit and the combination of switching barriers with other products decrease the customer departure. Second, as the number of free content and monthly subscription increases, the chances of leaving are increased. As the number of paid contents increases, the chances of dropping are decreased. Third, as customer complaints increase, customer withdrawal increases. However, as the maintenance period increases, customer withdrawal decreases. In conclusion, consumer behavior has been proved to have mediating effects on the relationship between switching barriers and content use and customer departure. Innovators and early adopters with high innovation tendency were more dissatisfied and more likely to leave the customer than the variables used as control variables.

Research limitations/ Implications: The study implies that the IPTV service, which is a high-tech based convergence service based on the innovation characteristic of the control variable, evolves from Innovators to late adopters, This study suggests that follow-up study is required for user research in the field of technology management by studying and analyzing how the new high-tech based convergence service produces interactivity with consumers in the market.

The implications of this study are as follows: First, increasing the barriers to switching can reduce customer dissatisfaction and increase the utilization rate of customers' preferred content, maximizing the profit of the company and decreasing the customer deviation. Second, customers who actively raise customer complaints during consumer behavior have a higher purchase rate of paid contents, and suggest that reducing the customer complaints through targeted marketing strategies for these high involvement customers can reduce the customer turnout. This implies that it is necessary to design a systematic loyalty program for thorough customer complaint management and loyal customers.

Keywords: Innovative Convergence Service, IPTV, Content Usage, Churning Behavior, VoC, Switching Barriers

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The Important Factors on Strategy for Making Smart City

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Abstract

The purpose of the study aims at presenting the important factors on strategy for making smart city. From the perspective of the macro, Smart City is a physical space that responds to the times, as a value shared space of society, in the future employment and the experiment and application of advanced industrial technology, it is a major income source that dominates Korea's future. There is a strategy, it is an important agenda of the state. In Smart City, we will be able to efficiently accommodate the technical aspects that enable efficient rearrangement of developed technology and the citizens' desires of citizens who are the top priority beneficiaries of Smart City, Aspects of international cooperation such as policy aspects facilitating relocation of policy, overseas export through this and standardization of technologies for overseas cooperation, etc. There are three aspects. Cities where restructuring and in-house power generation are possible through the continuous interaction of technologies and services, emphasize the value of communication, cities to which citizens participate, the establishment of appropriate communication equipment. The city where true governance between public, citizen, and company is done is a smart city at once. In this research, through a thorough in-depth interview with smart city-related experts, the authors investigated strategic factors for successful consolidation and efficient operation and management of Smart City, resulting in five strategic elements "3AES" so-called Affordability, Adjustability, Adaptability, Expandability, and Sustainability.

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How does characteristics of target's knowledge-base affect to technological innovation performance of acquirer? A case of biopharmaceutical industry

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Extended Abstract

Purpose/ Research Question:

The high-tech firms make effort to increase own technological competitiveness through not only internal R&D but also active technology acquisition from outside (Yoon, Shin, & Lee, 2016). This has been recognized as not optional but essential element for corporate survival in the tide of open innovation. In particular, the pharmaceutical industry which are upstream in healthcare industry exceptionally has prevailed technological cooperation by actively M&A (Mazzucato & Parris, 2015). It is because the uncertainty of technological innovation in the pharmaceutical industry is high, it has a characteristic of fusion, and, furthermore, cumulateness of technology is high, so it is burdensome to research and develop various technologies at once (Pisano, 2006). The acquirer in pharmaceutical industry can obtain strong ownership and control right from target through M&A, which can quickly convert acquired technologies to internal capability of acquirer under competitive environments (Singh and Montgomery, 1986; Yin and Shanley, 2008), but it's difficult to derive the intended technological innovation outcomes from the M&A.

A variety of studies have been conducted on the question of why there is a difference in the creation of technological innovation performance through M&A. However, in spite of the fact that technological acquisitions are essentially M&A activities aimed at acquiring superior technologies of target companies, there has been less interest in knowledge-base characteristics of target. Therefore, this study is interested in how the technological characteristics of the target have influenced the technological innovation performance of the acquirer. In particular, this study would like to focus on the qualitative value of the technology of the target company, using patent citation analysis, differently from the previous studies that have paid particular attention to quantitative aspects of technology (Choi & Park, 2009; Yun, et al., 2018).

Key Literature Reviews

Ahuja and Katila (2001) found that within technological acquisitions absolute size of the acquired knowledge base enhances innovation performance, while relative size of the acquired knowledge base reduces innovation output. The relatedness of acquired and acquiring knowledge bases has a nonlinear impact on innovation output.

Cassiman, et al. (2005) found through in-depth analysis of 31 companies that the existence of ex-ante complementary technologies between the two partners increased the technological innovation performance after M&A. On the contrary, the existence of substitutive technologies prior to M&A has caused the decrease in technological innovation performance after M&A.

Cloodt, et al. (2006) examined the post-M&A innovative performance of acquirer in four major high-tech industry. In technological M&As, absolute size of the target's knowledge base only has a positive effect during the first couple of years, but a large relative size of the acquired knowledge base reduces the technological innovative performance of the acquirer. Moreover, the relatedness between the acquired and acquiring firms' knowledge bases has a curvilinear impact on the acquirer's innovative performance. This indicates that companies should target M&A 'partners' that are neither too unrelated nor too similar in terms of their knowledge base.

Makri, et al. (2010) emphasized that the relatedness of knowledge-base between acquirer and target is crucial in creating the technological innovation performance of acquirer, after M&A. However, he argued that there are some studies on the similarity of knowledge-base between acquirer and target and the technological innovation performance of the acquirer, but the research on the complementariness characteristics of the technology is insufficient.

Carayannopoulos and Auster (2010) with data of 209 research-driven biotechnology firms based in North America found that external knowledge sourcing through acquisition is more likely when the knowledge domain is more complex and valuable. In addition, increasing similarity and digestibility of the dyad's knowledge bases between acquirer and target strengthen the relationship between knowledge value and the probability of acquisition.

Desyllas and Hughes (2010) found that in related acquisitions, a large knowledge base tends to increase R&D productivity, consistent with an enhanced capacity to select and absorb targets. In unrelated acquisitions, however, this relationship becomes increasingly negative as knowledge base concentration increases.

Valentini (2012) explored the effect of M&A on the patenting quantity and quality of the acquirer. Three measures of quality are considered: impact, generality, and originality. Applying a matching estimator to data from the U.S. 'medical devices and photographic equipment' industry from 1988 to 1996, he found that M&A have a positive effect on patenting output, but decrease patent impact, originality, and generality.

Lodh and Battagion (2015) with a sample of 202 US biotechnology firms between 1990 and 2009, investigated the extent to which the mergers and acquisitions with different partners contribute to the depth and breadth of the focal firm's knowledge base. Their analysis showed that acquisitions of related firms mainly increase the depth of knowledge, while acquisitions of unrelated firms develop the breadth of knowledge.

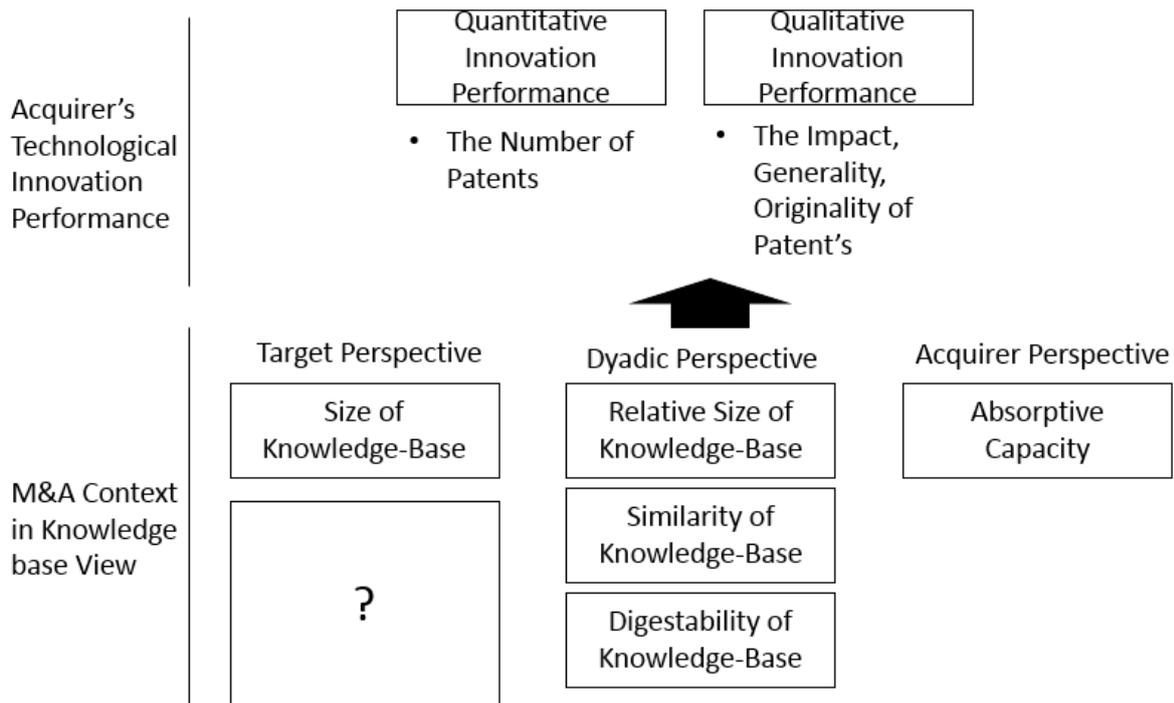
Jo, et al. (2016) examined to present dyadic perspective variables, including technological similarity and technological digestibility which affect the assimilation, transformation, and exploitation processes of the absorptive capacity with 220 cases of technological M&As in the biopharmaceutical industry from 1993 to 2007. In addition, they investigate the role of M&A experience as a moderator of dyadic characteristics and innovation performance of technological M&As.

Jeong and Ko (2016) analyzed alliance portfolios and identified the four groups in Toyota and Hyundai's portfolio using information of patent citation. They categorized four groups according to the degree of collaboration and patent quality and analyzed the properties of the representative partners in each group.

Han (2017) emphasizes that exploitation of accumulated knowledge can lead to architectural innovation. Innovation is a long time cumulative process of a great number of organizational decision-making process, ranging from the phase of generation of a new idea to its implementation phase. Han (2017) showed that cumulated knowledge that has been formed in repetitive decision making becomes a medium, so called, for architectural innovation that facilitates linkage in the company's existing knowledge base.

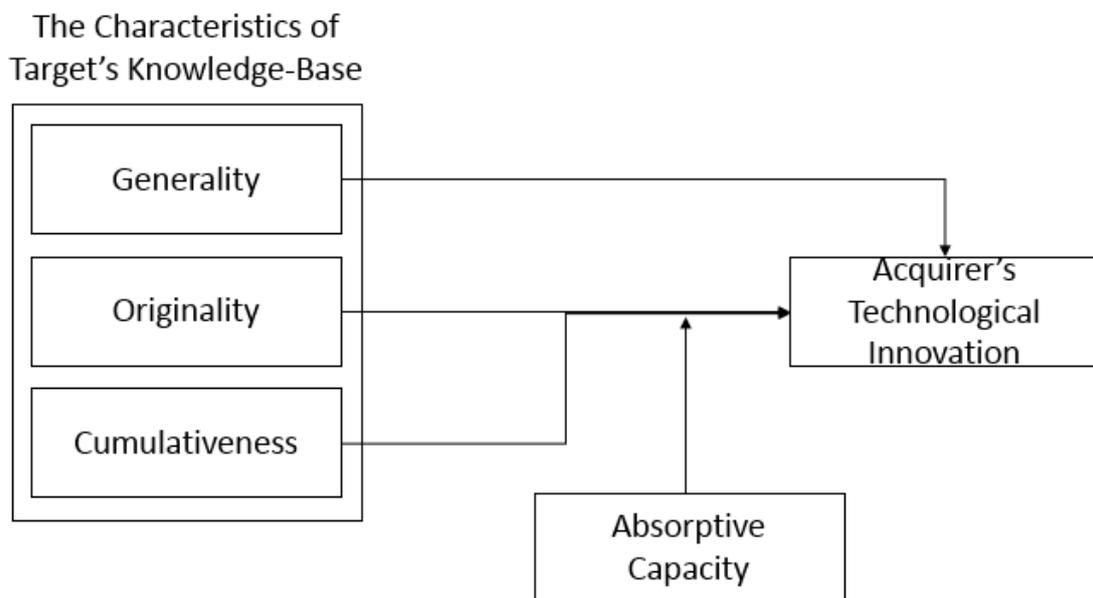
Dougherty (2017) emphasized connectivity in complex ecosystems. Repeated networking within a complex ecosystem increases firm's inherent technological innovation performance beyond limitation of existing knowledge-base and capability trap. He emphasized that these company-specific technological innovations again serve as a good signal for networking within complex ecosystems, accelerating it.

In the previous studies, the size of knowledge base of target, the absorptive capacity of the acquirer, the relative size of the knowledge base, the similarity of the knowledge base and digestibility from the dyadic perspective are the factors that create the technological performance of acquirer after M&A. However, despite the fact that technology M&A is based on the technological value of the target company, there is no research on the influence of the technology quality of target on the technological innovation performance of the acquirer.



Design/ Methodology

[Research Design]



[H1] The generality of target's knowledge-base has an inverted U-shape relationship to innovative performance of acquirer through M&A

[H2a] The originality of target's knowledge-base has a positive relationship to innovative

performance of acquirer through M&A.

[H2b] The cumulativeness of target's knowledge-base has a negative relationship to innovative performance of acquirer through M&A.

[H3a] The acquirer's absorptive capacity, moderating originality of target's knowledge-base, positively influences on the acquirer's innovative performance.

[H3b] The acquirer's absorptive capacity, moderating cumulativeness of target's knowledge-base, positively influences on the acquirer's innovative performance

[Methodology]

- Method: Negative Binomial Regression

■ Data: Medtrack Data (deal information of 2016), WARDS Data (firm information of 2014), GPASS Data (patent information of 2014, 2016)

■ Variables:

Variables	Measurement
Dependent Variable (t+2)	The number of patent applications of acquirer
Independent Variables (t)	
Generality	$\text{Generality}_i = 1 - \sum_{j=1}^n s_{ij}^2$ <p>s_{ij} indicates the percentage of citations <i>received</i> by patent i that belongs to patent class j, out of n patent classes.</p>
Originality	$\text{Originality}_i = 1 - \sum_{j=1}^n t_{ij}^2$ <p>t_{ij} indicates the percentage of citations <i>made</i> by patent i that belongs to patent class j, out of n patent classes.</p>
Cumulativeness	Cumulativeness_i = The number of patents including selfcitation
Absorptive Capacity	R&D intensity of acquirer (R&D expenditure / Revenue or the number of employees)
Control Variables	
Size	The number of employees of acquirer
Age	The age of acquirer from founding year
Business Diversification	The number of firm's businesses

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**The Influence of Government R&D Investment on Innovation performance of
Korean Pharmaceutical Firms**

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How pipeline management affects on innovation performance in pharmaceutical industry

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Abstract

Purpose/ Research Question

Grawal (2008) proposed that portfolio breadth(number of different therapeutic categories) is key factor for success of new drug development to shareholders and considerable diversification in therapeutic categories exists in new drug development. Although they proposed systematic results, they did not include the level of innovation and the long-term effect of portfolio due to the limited data.

Diversification across many indications seems to reduce the variation in firm performance by increasing the probability of drug development and the diversification of new drug also leads to innovation and improved productivity. So, firms have increased the drug project diversity by forming development alliances with partner firms and such alliances have become a vital source of innovation in the pharmaceutical industry and higher probability of success during clinical trials (Danzon, Nicholson, & Pereira, 2005)

Recently, the effects of firm's alliance portfolios, which refers to a collection of alliances on innovativeness and profitability have been studied in strategy (Hoffmann, 2007), marketing (Cui, 2013) and pricing factors (Lee, 2018A). Lee (2018B) proposed that development phase and attrition rate are influential determinants to estimate the license fee by drug class for potential business transactions.

So, we will analyze to know how pipeline management affects on innovation performance in pharmaceutical industry ;

- strategy for diversification such as, therapeutic categories, indication and development stages
- strategy for alliances with their financial status.
- effects from diversification and alliances
- different outcomes between alliance and self-development

Key Literature Reviews (About 3~5 papers)

The R&D cost of the pharmaceutical industry constitutes 8-15% of all industries in developed countries because of the limited patent duration of launched drugs, long development time to penetrate into market, the increasing costs for the development, approval and marketing of drugs and, high probabilities of failure at every stage of development (Shankar, 2007 ; Ding, 2014).

Many pharmaceutical companies have invested vastly to pharmaceutical research and development (R&D) but, the number of new molecular entities (NMEs) approved by the US Food and Drug Administration (FDA) since 1950 remains low (Munos, 2009).

So, the open innovation such as the introduction of pipeline drugs through alliances with outside firm is one of the very important strategy, like the open innovation strategy by external capabilities and resources is essential in most companies (Lee, 2018C). In fact, many small and medium-size enterprises in the healthcare IT industry have innovative technology and can commercialize in order to have sustainable growth (Kim, 2018).

In addition, in highly risky pharmaceutical industry environments, firms turn to portfolio management to develop successfully new drugs and maintain sustainable competitive advantages and long-term profitability (Cooper, Edgett, & Kleinschmidt, 2004).

To increase efficiency of research and development (R&D), the pharmaceutical industry has implemented strategies such as open innovation, wherein they sell their intellectual property, maximize their use of external resources, adjust their structures (K Shin, 2018B).

Recently, Shin (2018A) proposed that there are effects of innovative capacity on financial performance and of technological innovation performance through enhancing innovative capacity.

However, as there is no suitable tools for the future revenue of new product development, a net present value analysis to make decisions for product development has been used. Although the valuation of individual projects can be useful, pharmaceutical firms also need to understand the total value potential of their portfolios. A common approach is to roll-up individual project valuations into total valuation.

Grewal (2008) proposed that the new drug portfolio strategies and a stock price-based measure can assist in understanding shareholder expectations of a firm's future cash flows and they used four descriptors of a firm's new drug portfolio strategies to relate them to Tobin's q, a stock market-based indicator of a firm's value.

- 4 Portfolio strategies : portfolio breadth, portfolio depth, blockbuster strategy, and stages of the drug development process
- Portfolio breadth refers to the number of different markets(therapeutic categories) targeted by a firm's new drug portfolio
- Portfolio depth refers to the extent to which resource allocation varies across different markets or therapeutic categories
- With a blockbuster strategy, a firm exclusively allocates its resources to a few diseases with a high expected market potential rather than distributing resources among diseases with varying expected market potentials

They concluded that shareholders have positive expectations of firms with higher portfolio breadth and a blockbuster strategy. For shareholders, they found that the final stage of the drug development process is critical for most firms but, the earlier stages of drug development process and portfolio depth are also valued for most small firms.

Design/ Methodology/ Approach

Drug portfolio includes both approved and candidate drugs and, a drug pipeline is the set of drug candidates that a pharmaceutical company has under discovery or development.

Because we assume to acquire more information about innovative results from developmental pipelines, we will concentrate on the drug pipeline with MedTrack, a leading database that tracks drug development records in the pharmaceutical industry.

The effects of firm's alliance portfolios, which refers to a collection of alliances on innovativeness and profitability have been studied in strategy (Wassmer, 2010), marketing (Cui, 2012) and Pricing factors(Lee, 2018)

Firm's activities on diversification about drug development are as follows ;

- therapeutic categories
- indication expansion
- firm's development types such as, chemical, biopharmaceutical and/or generic drugs.
- development stages to concentrate on earlier stage or later stage
- status of pipeline numbers

For systematic analysis, diversification indices such as variety, HHI(Herfindahl-Hirschman Index), modified HHI, entropy and etc. will be calculated and the correlation with variables of interest will be evaluated through regression analysis.

Variables		Definition
Dependent variables	Financial outcomes	• Average value(stock-based) per year, Revenue
	Nonfinancial outcomes	• # of patents enrolled, # of new product
Independent variables	Portfolio breadth	• # of different therapeutic categories targeted by a firm's new drug portfolio • Diversification indices*
	Portfolio depth	• Variation in the # of diseases targeted across therapeutic categories • Diversification indices*
	Blockbuster strategy	• Portfolio targeting a few diseases with high expected market potential
	Stages of Drug development	• # of earlier stage product in preclinical, phase I • # of later stage product in phases II and III
	Stages of Alliance	• # of earlier stage alliance in preclinical, phase I • # of later stage alliance in phases II and III

* Diversification indices : Variety, HHI(Herfindahl-Hirschman Index), Modified HHI, Entropy etc.

(Expected) Findings/Results

The pipeline management for the development of new drug is very challenging research area in pharmaceutical industry and we may suggest from our researches ;

- Suitable diversification strategy : therapeutic category, indication, pipeline number at development stages
- Strategy for alliances : suitable stages for alliance from pipeline
- Financial and nonfinancial effects from diversification and alliance
- Effects on innovative performance between alliance and self-development

From this research, we may secure best options to overcome a lot of challenges in deciding on how to allocate resources in order to achieve the maximum returns.

Research limitations/ Implications

In this research, there is a limitation about the more divided analysis of deal cases, as we don't know right deal types, partner's financial status at deal time, although alliance have become a vital source of innovation and higher probability of success.

Keywords: Pipeline, Diversification, Innovation

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How to overcome uncertainty? : Impact of firm-level uncertainty on firm's alliance portfolio management in the pharmaceutical industry

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Abstract

The pharmaceutical industry is one of the most research-intensive industries and characterized by high uncertainty and hyper competition. To alleviate this various uncertainties (internal and external) and increase performance, firms enter into alliance portfolio management with different partners (public and private), phases (early and late) and types (partnership, licensing). In this paper, we first classified various uncertainties into internal (technology, skill, finance) and external (market, demand) and measure them by using forecasting model. And then, we present empirical evidence on the effect of uncertainty on firm's alliance portfolio management, and also, this alliance management finally affects to the firm performance. To test these propositions, case of US pharmaceutical industry is selected and an integrated data set consisting three different data sets is used: Alliance data from Medtrack, product data from Medtrack and Orange Book, firm data from Compustat, and patent data from Lexis Nexis Total Patent database.

Purpose/ Research Question

The pharmaceutical industry is facing severe challenges to its business model (Paul et al., 2010) and are under constant severe pressure to discover new drugs. Drug development process is time-consuming and expensive (DiMasi et al., 2003). Also high uncertainty and low success rate of drug development are central to company survival (Shin et al., 2018) and thus it is crucial for policy maker (Shin et al., 2018). Also, pharmaceutical firms are confronted various uncertainties such as scientific developments and changing industry environment (Ding et al., 2016), pharmaceutical R&D is facing a productivity crisis characterized by stagnation in the numbers of new drug approvals in the face of increasing R&D costs (Rafols, Ismael, et al., 2014).

For these reasons, strategic alliances have become important for improving a firm's performance in this industry and now we suggest the following questions; (i) *Whether the firm facing uncertainties affect firms' alliance portfolio management?* (ii) *Does firms' alliance portfolio management positively related to firm performance?.* For the question (i), we divided firm-level uncertainty into two parts (internal and external) and estimated each levels of uncertainties. Also, for the question (ii), we classified the alliance portfolio into alliance partner, stage, type.

Key Literature Reviews

The biotechnology industry is an industry characterized by high uncertainty and hyper-competition (D’Aveni, 1994; Shin et al., 2018), and firms enter into alliances with different motivations that include learning new skills (Baum et al., 2000) or gaining access to complementary resources (Dyer & Singh, 1998). Therefore, utilizing not only their own but also external knowledge (Yun et al., 2016) and networks are becoming important firm’s strategy (Kim et al., 2018). Also, as previous researches, high technology firms can no longer rely exclusively on their internal skills and knowledge in maintaining innovativeness. These companies access external sources of knowledge through alliances and harvest this knowledge by creating innovative products, goods, and services (Arora & Gambardella, 1994; Deeds & Hill, 1996; Zahra & Bogner, 2000). Apart from external condition, understanding and managing organizational ambidexterity is critical and it can be either conducive or detrimental to firm performance (Yu et al., 2018).

Previous studies analyzed alliance portfolios using the quantitative indexes as the number of partners, partner diversity, intensity of partnership (Jeong et al., 2000). Especially alliance portfolios in the pharmaceutical industry can be approached from different perspectives, all of which have their merit⁶: (i) *a learning perspective*, as alliances are vehicles to access external resources that may complement internal resources, that is to say include the acquisition of two kinds of knowledge: information and know-how (Shakeri et al., 2017), (ii) *a relational perspective*, as alliance portfolios offer unique governance problems; (iii) *a risk perspective*, as alliance portfolios, if properly designed, serve a risk reduction function; and a cost perspective, as the cumulative investment costs associated with expansive alliance portfolios can be very substantial.

Freel (2005) emphasizes that increased environmental uncertainty creates the incentive for market segmentation strategies that require that the emphasis be placed upon innovation. In that paper, he distinguishes firm facing uncertainties between 1) uncertainty in the economic environment, 2) Market and industry uncertainties, 3) Internal resources uncertainties and empirically shows the relationship between uncertainties and innovation in small firms.

Design/ Methodology/ Approach

Based on Freel (2005) and Banerjee (2017) model, we came up with more specified research framework (See Figure 1). In the external uncertainty consists of market and demand factor, and internal uncertainty variables are technology, skill, finance. Also, as a matter of alliance portfolio management, firm’s partner, alliance stage, and type are classified and derive each effects.

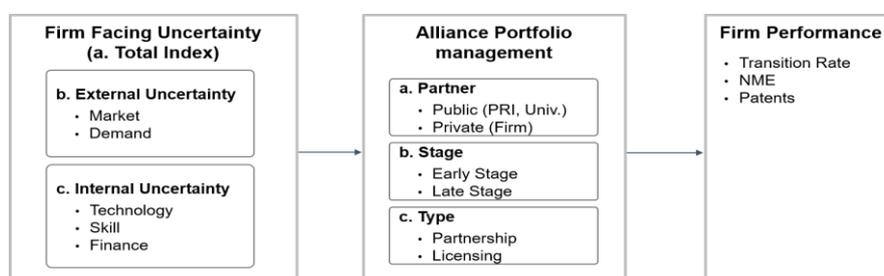


Figure 1. Research Framework (Preliminary)

To measure the uncertainty, we use a second-order autoregressive, AR(2), specification as the

⁶ See also Ding et al., 2016.

forecasting model based on the Box and Jenkins(1970) formulation for forecasting economic variables(Ghosal et.al, 2005). The forecasting specification is⁷ :

$$Z_t = \alpha_0 + \alpha_1 Z_{t-1} + \alpha_2 Z_{t-2} + \varepsilon_t \quad (1)$$

For example, if Z is a market sales data, the predicted values represent the forecastable component from the specification (1). The residuals $\hat{\varepsilon}_t$ seen from (2) represent the unsystemic, or unforecastable component.

$$\hat{\varepsilon}_t = Z_t - (\hat{\alpha}_0 + \hat{\alpha}_1 Z_{t-1} + \hat{\alpha}_2 Z_{t-2}) \quad (2)$$

Since $\hat{\varepsilon}_t$ can be positive or negative, squared value of $\hat{\varepsilon}_t$ is used for uncertainty variable as (3).

$$\text{Demand Uncerativity} = \sigma_{\text{mkt},t}^2 = (\hat{\varepsilon}_{\text{mkt},t})^2 \quad (3)$$

In this study, firm-level product and technology data of pharmaceutical firms that have approved and merchandised products in US market are used. The pharmaceutical industry is characterized by huge R&D cost, long commercialization periods and complex and lengthy approval procedures. This condition makes their product to be very reliable indicator due to the required financial and time investment. In order to add the products' approval date, the commercialized product information from Medtrack database is merged with product classification from the Orange Book (also known as "Approved Drug Products with Therapeutic Equivalence Evaluations"), which identifies pharmaceutical products approved by Food and Drug Administration (FDA). In addition to this, the US patent data from GPASS of the listed firms and their characteristics from Compustat are added (See table 1).

Table 1. Description of variables used (Preliminary)

Variables	Definition	Data Source
<i>Control variables</i>		
Age	Age of firm	Compustat
R&D Intensity	R&D expenditure divided by sales	Compustat
Firm size	Full-time-equivalent(FTEs) employees	Compustat
<i>Uncertainty</i>		
External (Therapeutic areas)	Market : changing numbers of competitors	IMS National Sales Perspectives /
	Demand : changing levels of market sales	
Internal	Technology : changing levels of technological accumulation	IMS Specialty Market Dynamics (TBD)
	Skill : changing levels of human resource	
	Finance : changing levels of firm profit	
<i>Alliance Portfolio Management</i>		
Partner	Public : alliance with PRIs, universities	Metrack
	Private : alliance with private firms	
Stage (Drug development phases)	Early : Discovery, Formulation, Lead molecule, Preclinical	Metrack
	Late : Phase I, Phase II, Phase III	
	Type	
Firm Performance	Licensing	Metrack
	Transition Rate	
	Patent	
	NME	

⁷ See also Ghosal et al., 2015

Expected Findings/Results

This study aims to analyze firm's external and internal uncertainties affects alliance portfolio management and expected to find three important findings; (i) *uncertainties boosting firm's alliance portfolio management*, (ii) *Firm's alliance portfolio management have a positive effects on firms performance*. As external uncertainty increased, firms tends to make a late stages with private firms and they make a better performance. However, for overcoming internal uncertainty, firms tends to make alliances with public institutes or universities in early stages and this leads to a firm performance.

Research limitations/ Implications

From an academic perspective, the study of alliance portfolio management in the pharmaceutical industry can be approached from different perspectives, the learning and real options perspective. For the external uncertainties, firm make alliance portfolio to managerial perspective for spread their bets and risks. Therefore, licensing in late stages with firms would be a good strategy for making a performance. However, for the internal uncertainties, firms benefit from external knowledge especially in early stages with public sector by R&D partnership and this supports learning perspective. To conclude, firm's portfolio management is a crucial strategy for performance in uncertain environment. To elaborate this research, detailed study of variables, data, methodologies, and econometric models should be more specified.

Keywords: Uncertainty, External uncertainty, Internal uncertainty, Alliance portfolio management, Pharmaceutical industry, Firm performance

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62.

**Factors affecting Outbound Open Innovation Performance in Bio-
Pharmaceutical Industry**

- Focus on Out-Licensing Deals

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Introduction

Characteristics of Bio-Pharmaceutical Industry

The fact that only about one out of 10,000 substances discovered in the R&D phase in the pharmaceutical industry becomes a marketable product (Gassmann and Reepmeyer 2005) shows the tremendous risk that these firms face regarding the outcome of their innovation efforts.

Pharmaceutical and chemical firms are under increasing regulatory and commercial pressure due to exceptionally high initial R&D costs (Whitehead et al. 2008; Arora and Fosfuri 2000) and long product development life cycles (Teece 1998).

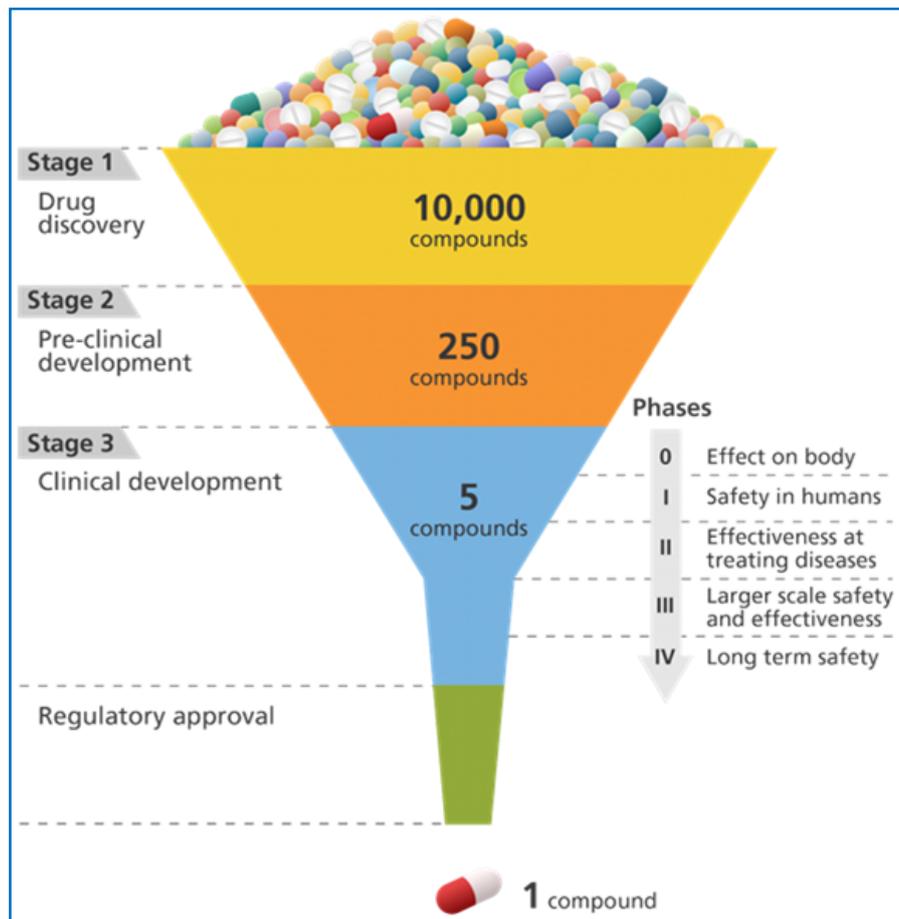


Fig. Expensive and time-consuming drug development process

Research Background

OUTBOUND OPEN INNOVATION - Out Licensing strategy

Open Innovation consists of different strategies in three archetypes Inbound(outside-in), outbound(inside-out) and coupled processes. (Gassmann and Enkel, 2004; Kiso Shin. 2018)

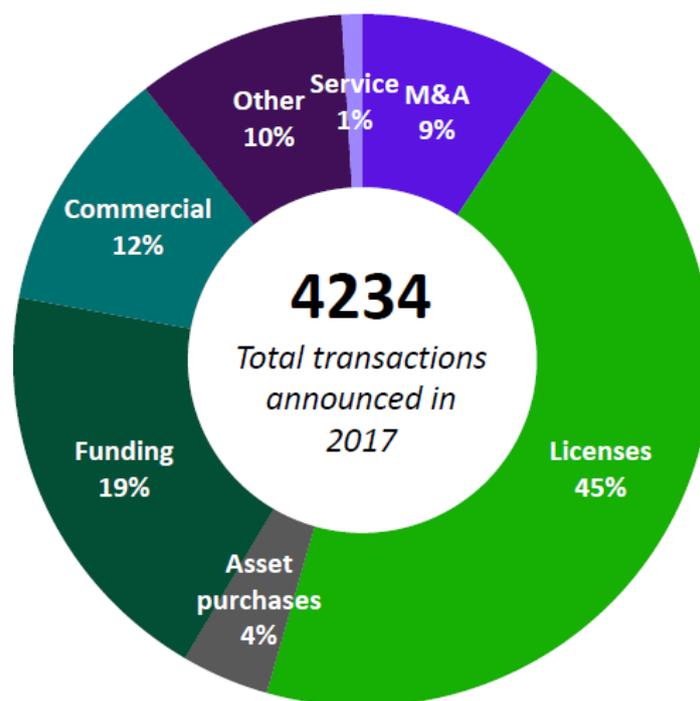
Earlier open innovation research focused on inbound processes, whereas outbound processes have received less attention (Mortara, L.2011)

Outbound open innovation, such as **Out-licensing**, is an inside-out process and includes opening up the innovation process to external knowledge exploitation (Mortara, L. 2011)

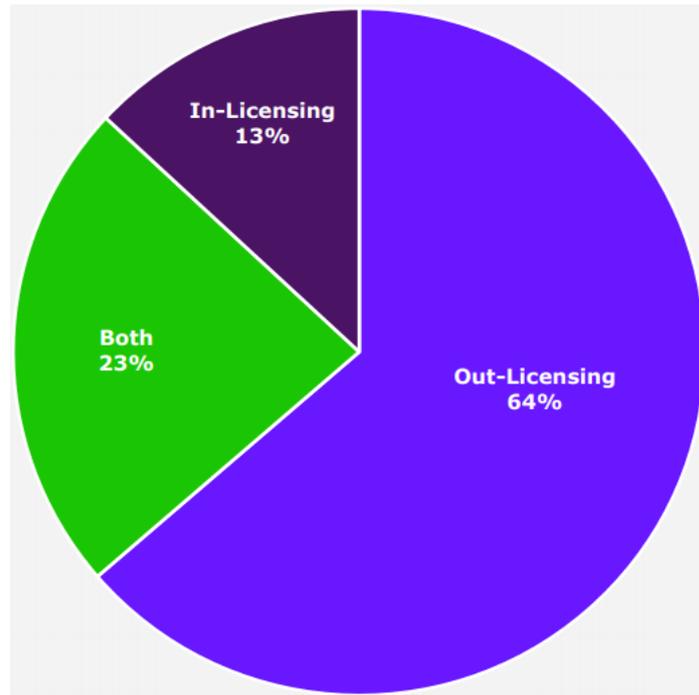
Out-licensing allows firms to capture additional value from their technology(Di Minin et al., 2010;Kim, 2009)

In the biotech industry, licensing loyalty is recognized as one of the most important revenue streams and as an Exit strategy to overcome the economic crisis. (Jeong Hee Lee et al. 2018)

Importance of Licensing in the Pharmaceutical Industry



Overview of all life sciences deals captured by Cortellis in 2017 by percentage



2018 BIO Convention Companies Nearly 2/3 are looking for Out-licensing opportunities Nearly ¼ are seeking in-and out-licensing

The pharmaceutical industry has transformed itself into an open innovation ecosystem, and licenses have become a core business model for biotechnology companies. (JIMMIE HOFMAN, 2016)

Knowledge Based View

RBV points out that the ability to use resources appropriately for innovation is the key to enterprises' innovation and success (Barney,J.1991 ; Priem,R.L,2001 ; Teece,1997 ; Wang, 2007).

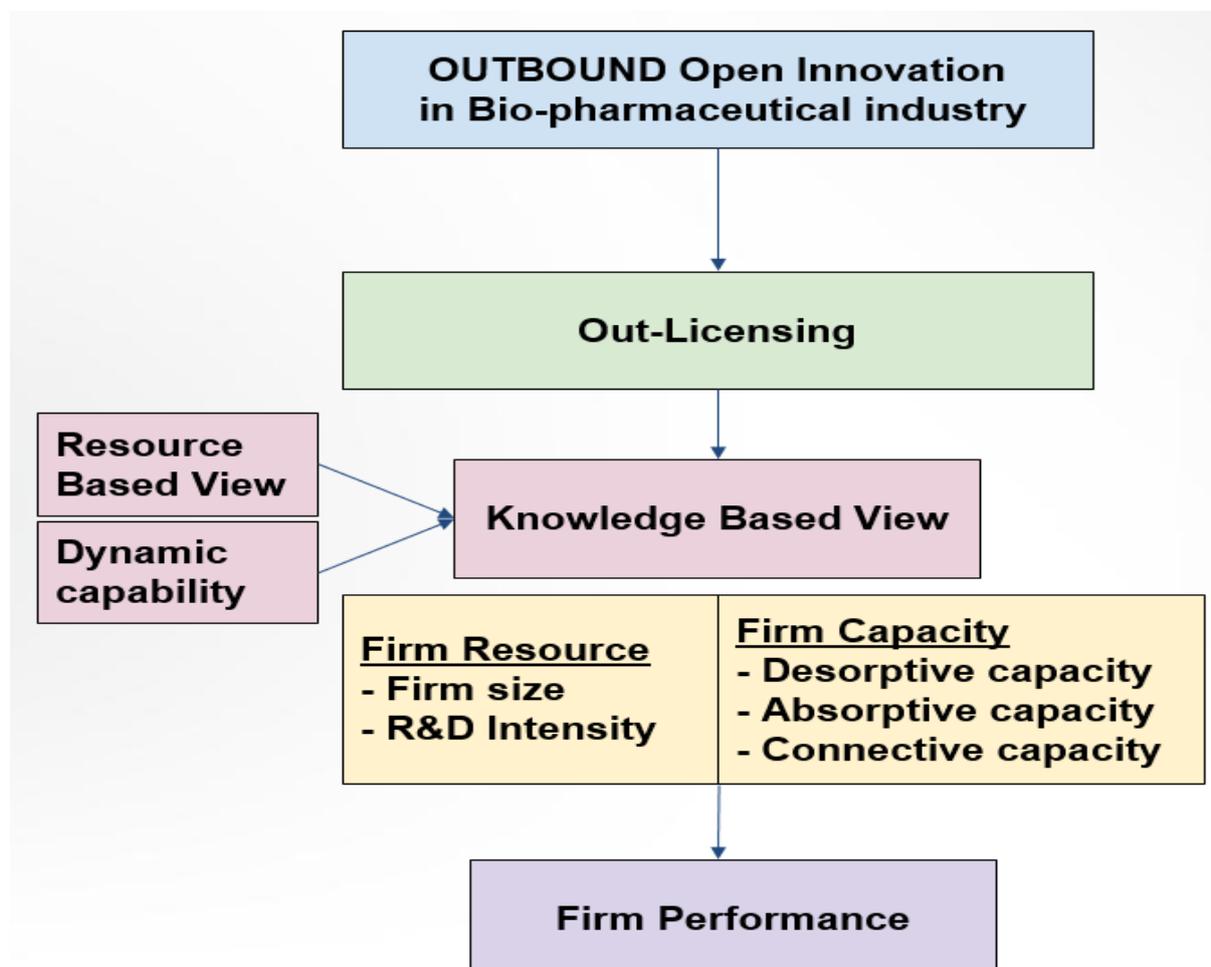
The combinative perspective of resource-based view and dynamic capabilities in the **knowledge-based view** helps managers to understand and explain most of the complex business phenomena they encounter and to expand the firm's boundaries(Kwangsoo Shin, 2018).

Knowledge Based View - Firm capacity

Two distinct concepts are used to analyze the management of licensing activities: Absorptive capacity for **licensing-in** and Desorptive capacity for **licensing-out**. (JAMAL-EDDINE AZZAM, 2018; Yun J.H.J., et al. (2018).

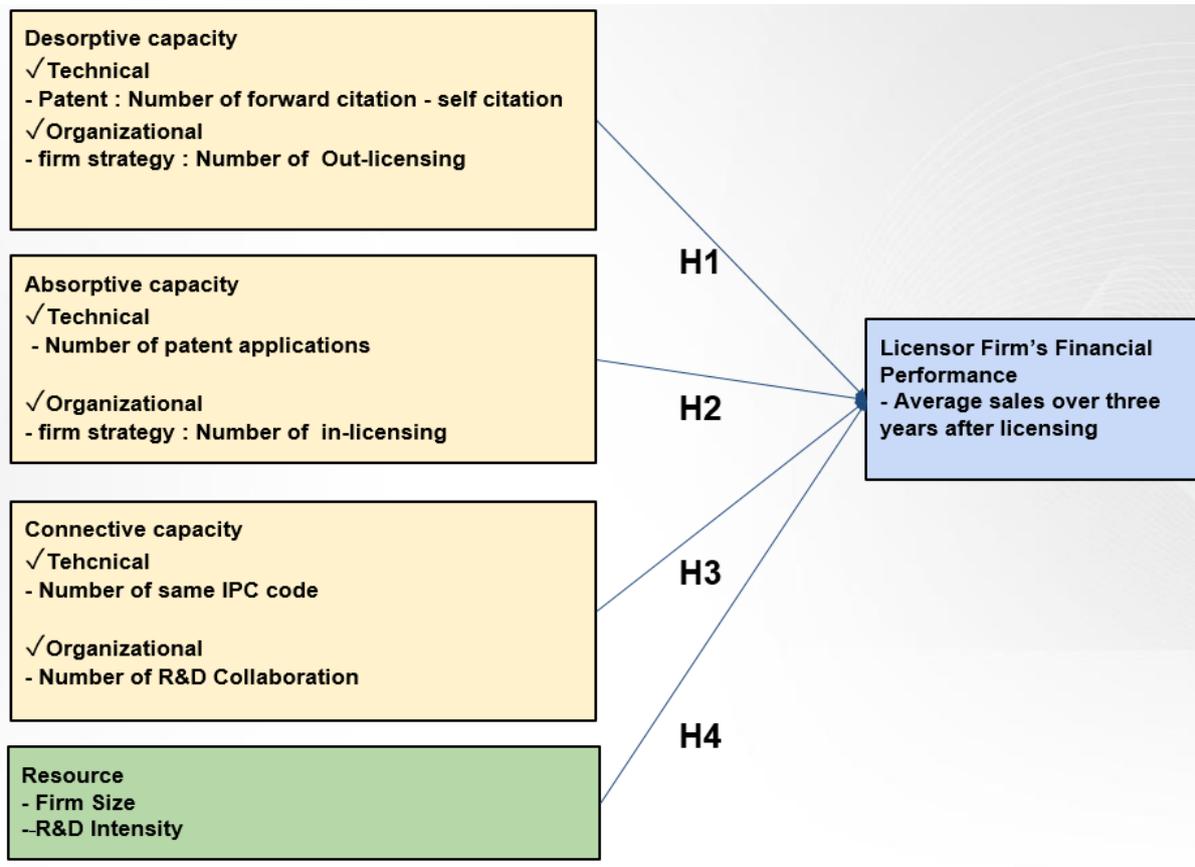
Connective capacity refers to the ability to establish links to other elements, and these connections facilitate knowledge access (Luhmann, 1995) and has a positive impact on the technological innovation performance of firms (Kwangsoo Shin, 2018).

Research Frame



The research is aimed at revealing that the licensor firm's capabilities and resources will affect the financial performance through Knowledge-Based View in the open innovation ecosystem.

Our research used pharmaceutical data to prove this through Quantitative analysis.



Hypothesis

H1: In the licensing agreement, Licensor's 'Descriptive Capacity' will be positively correlated with Licensor's financial performance.

H2: Licensee's 'Absorptive Capacity' will have a significant correlation with Licensor Firm's financial performance.

H3: Licensor and Licensee's 'Connective capacity' will have a significant correlation with Licensor's financial performance.

H4: Licensor Firm resource will be positively correlated with Licensor's financial performance.

Variables

	Variables		description	Reference
Independent Variables (Firm Capacities)	Licensor Descriptive Capacity	Technical	Number of forward citations minus self citations (CITN)	Kwangsoo Shin,2018
		Organizational	Number of Out-licensing (OL)	Mattia Bianchi, 2011
	Licensee Absorptive Capacity	Technical	Number of patent applications (PAT)	Ahuja and Katila (2001), Vanhaverbeke et al. (2002) Kwangsoo Shin,2018
		Organizational	Number of In-licensing (IL)	Mattia Bianchi, 2011
	Licensor& Licensee Connective Capacity	Technical	Number of same IPC code (IPC)	Arora, 1995
		Organizational	Number of R&D collaboration (COLA)	Mattia Bianchi, 2011
Control Variable (Firm Resources)	R&D Intensity		R&D Intensity(RND)	Kafouros & Forsans, 2012
	Firm Size		Number of Employee (SIZE)	Ulrich Lichtenthaler,2009 Kwangsoo Shin,2018
Dependent Variables (Firm Performance)	Licensor Financial Performance		Average sales over three years after licensing	Francesca Michelino,2015 Erica Mazzola,2016

Research Data

MedTRACK

- MedTRACK is the most comprehensive, fully integrated global biomedical database providing for information on companies, products, patents, deals, venture financing, and epidemiology.
- It covers pipeline, financial, product, sales, partnering, and patent information on biomedical companies of countries, encompassing drugs, deals, venture transactions.

GPASS

- Patent data is used by LexisNexis and is provided in conjunction with patent offices in over 200 countries around the world.

WRDS

- WRDS data is the award-winning research platform and business intelligence tool for over 40,000+ corporate, academic, government and nonprofit clients at over 400+ institutions in 30+ countries.

OLS Regression

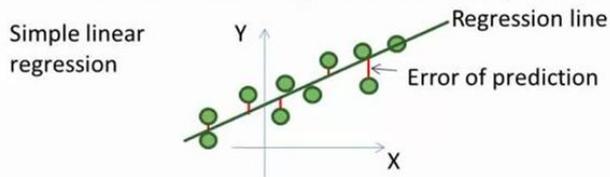
Ordinary Least Squares(OLS) regression

OLS Regression is an analysis that verifies the impact between variables.

- X_i are the k explanatory variables and Y is a dependent variable.
- The model is linear - for each sample n , the value y_n is:

$$y_n = \sum_{i=0}^k \beta_i x_{ni} + \varepsilon_n$$

- The coefficients β are found by minimizing the error of prediction:



$$FP = B_0 + B_1 \text{CITN} + B_2 \text{OUT} + B_3 \text{PAT} + B_4 \text{IN} + B_5 \text{IPC} + B_6 \text{COLA} + B_7 \text{RND} + B_8 \text{SIZE} + \varepsilon$$

Regression results

Statistical characteristics of independent variables

	Mean	Min	Max	Std.Dev
CITN	837.81818	1.00000	16937	2558
OUT	4.41818	1.00000	13.00000	3.21853
PAT	17.36364	1.00000	110.00000	25.11851
IN	1.56364	1.00000	4.00000	0.83364
IPC	0.72727	0	2.00000	0.59175
COLA	2.56364	0	9.00000	1.77183

RND	0.07116	0.00152	0.52697	0.08730
SIZE	69092	129.00000	157891	47529

Summary of coefficient of correlation and VIF

	VIF	CITN	OUT	PAT	IN	IPC	COLA	RND	SIZE
CITN	1.22499	1.000							
OUT	2.68287	- 0.04208 0.7603	1.000						
PAT	1.32270	0.25483 0.0604	0.03702 0.7884	1.000					
IN	1.30444	0.17546 0.2001	- 0.04116 0.7654	0.36766 0.0058	1.000				
IPC	1.12628	- 0.22527 0.0982	- 0.06541 0.6352	- 0.23864 0.0793	- 0.02048 0.8820	1.000			
COLA	2.63116	- 0.08219 0.5508	0.77298 <.0001	- 0.04796 0.7280	- 0.09369 0.4963	0.04335 0.7533	1.000		
RND	1.06772	- 0.06086 0.6589	- 0.07408 0.5909	0.16762 0.2212	- 0.01806 0.8959	- 0.06120 0.6571	- 0.10859 0.4300	1.000	
SIZE	1.49044	0.27246	0.39710	0.16985	0.29670	-	0.35096	-	1.000

		0.0442	0.0027	0.2151	0.0278	0.05951	0.0086	0.11179	
						0.6661		0.4165	

Results of regression(N = 55)

Variables		Explanation	Performance variables Financial Performance(FP) (Average sales over three years after licensing)
Knowledge capacity variables	Descriptive capacity	Number of forward citations minus self-citations(CITN)	0.0022**
		Number of Out-licensing(OUT)	0.6201
	Absorptive capacity	Number of patent registrations(PAT)	0.8261
		Number of In-licensing(IN)	0.7220
	Connective capacity	Number of same IPC code(IPC)	0.7559
		Number of R&D collaboration (COLA)	0.7683
Control variables	R&D intensity	R&D Intensity(RND) =xrd/expenditure	0.9416
	Firm size	Number of Employee(SIZE)	<.0001***

*** p < 0.001, ** p < 0.01

(Expected)Results

Our research is meaningful in that the financial performance of Licensor is analyzed empirically by dividing it into the firm's capabilities and resources from the perspective of Knowledge based view, focusing on out-licensing deal in the pharmaceutical industry.

As such, it helps to overcome the theoretical deficits of prior open innovation research, which limited our understanding of open innovation processes (Lichtenthaler, 2008).

In the licensing agreement, Licensor firm's capacities and resources will be positively correlated with Licensor's financial performance.

Implication & Contribution

Empirical research on resources and capabilities has not yet reached maturity (Miller and Shamsie 1996).

Our research is meaningful in that the financial performance of Licensor is analyzed empirically by dividing it into the company's capabilities and resources from the perspective of Open Innovation and Knowledge based view, focusing on *out-licensing deal* in the pharmaceutical industry.

Limitation & Future study

One of the limitations of this study is that time lag exist between Absorptive capacity, Desorptive capacity and Connective capacity, but due to limitations of data, time lag has not been reflected.

There is also a lack of studies on proxy discovery that reveal firm capacities for open innovation. e.g. the number of patent registrations, the number of family patents, the number of patent claims, clinical trial phase, R&D pipeline, co-patent, firm year.

More diverse indicators can be utilized to provide information on subtle differences according to them in future studies.

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63.

- **Development of rNPV(risk-adjusted Net Present Value) Technology
Valuation Improvement model in Bio-Pharmaceutical Industry**

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Abstract

Purpose/ Research Question:

The r-NPV method is the most frequently used the practical work in biopharmaceutical industry. Valuation for the drug under development is required for various purposes including merger and acquisition transaction, and two major quantitative valuation approaches, the discounted cash flow (DCF) method and the real options method are applied in the biotech industry. The risk-adjusted Net Present Value (r-NPV) method is an NPV method that uses only the attrition rate at the development stage as a discount rate to consider the risk at each development phase and has been developed to overcome the disadvantages of DCF and real options methodology. The r-NPV method, which considers the drug type as well as the development phase, has recently emerged in the biotech industry and provides accurate valuation for each-phase drugs.

In the existing r-NPV model studies, there were no research results subdivided by drug type and drug class, and we used only the short-term sample data as a whole. In addition, existing study results varies since there are no study results simultaneously presenting clinical development periods and success rates, which are the main variables of the r-NPV model. In this research, we try to present clinical development periods and success rates by matching and analyzing data set of clinicaltrials.gov and Medtrack DB.

Accordingly, the attrition rate and the development period, which are important variables in the r-NPV model, are also limited to the previous researches on new substance drugs, and the results of the attrition rate and development period are not consistently presented. In addition to new substance drugs, researches to improve the attrition rate and development period of biologic new drugs are necessary because they are presented separately by individual researcher as a result of a research. It is also necessary to improve drug class models.

Key Literature Reviews:

Because drug development requires long drug development period and enormous cost, licensing is regarded as a good strategy during development (Deloitte Centre for Health Solutions, 2015), so more licensing transactions are generated compared to other industries (Nigel Borshell, N., & Ahmed, T., 2012; MERGERMARKET, 2014), and valuation is used to calculate transaction price for licensing or M & A transactions (Bogdan B & Villiger R., 2010). And royalty is recognized as one of the major revenue sources in the biotech industry, and licensing is recognized as a good exit

strategy to overcome the economic crisis of bio pharmaceutical companies.

Table 1. Conventional Research Result for rNPV

Variable	Fredrick 2008	DiMasi 2010	BIO 2016
Attrition rate by all drug type	O	O	O
Development Duration by all drug type	O	X	X
Attrition rate by NDA(New matter)	X	O	O
Development Duration by BLA(Biologic)	X	X	X
Attrition rate by drug class	X	O	O
Development Duration by drug calss	X	X	X
Limitation	Studied 10 years ago	8 drug classes result only	Partly : Selected studies of Matching fund of US government
Period by studied data	-	1993~2009	2006~2015

Source: Fedric 2008; DiMasi 2010; BIO 2016

For this reason, a fundamental problem arises in applying the conventional rNPV method using the success rate and the development period. This is the point that there is need to select and use data of different times and types of existing rNPV research results as appropriate in order to evaluate the value for dealing with projects with high risk in the long term. Because it is more efficient to apply the average data value at the same time to the value of new drugs that can be put into the market, we need to consider this. (Table 1).

Design/ Methodology/ Approach:

The data utilized in this study are 150,000 datasets of Clinicaltrials.gov and Medtrack DB dataset that show the attrition rate of the clinical stage of the overall drug and the success rate of drug development by drug class (Fig. 1).

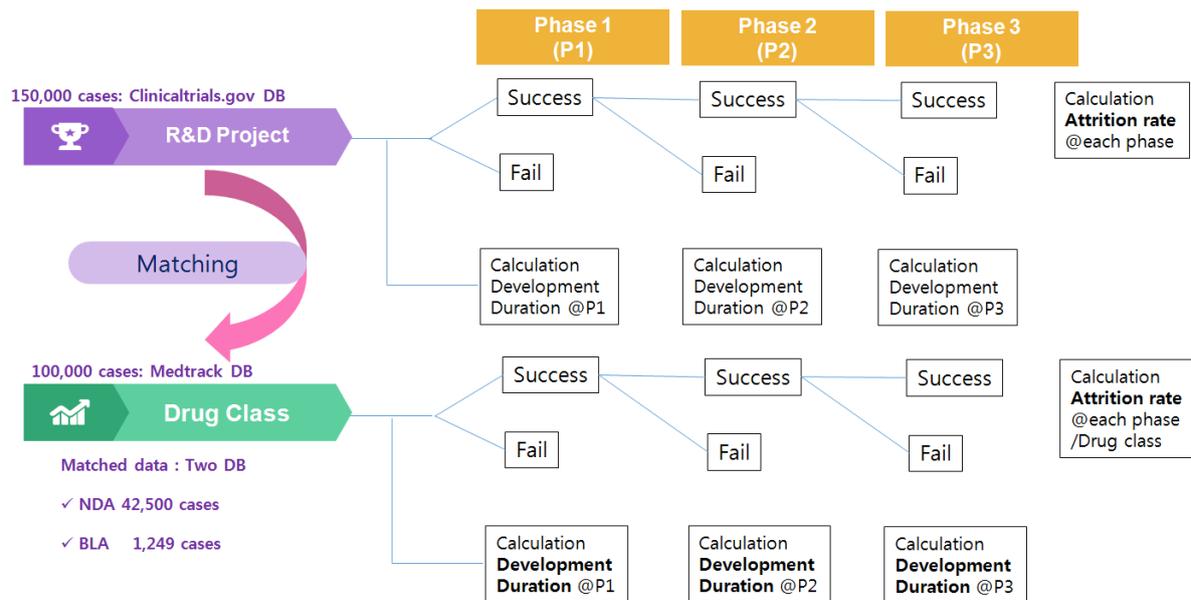


Fig. 1. Research frame

(Expected) Findings/Results:

As shown in Table 2, as a result of this study, we applied it to a new rNPV model of new drugs.

Table 2. New rNPV Model

단계	PC	P1	P2	P3	FDA	출시	합계
Period(t)	0	2.3	2.7	2.9	1.2	6	
Cost(Cpt)	5	10	15	70	3	210	
Profit(CFt)			-	-	-	490	
Attrition rate	100%	67.40%	42.50%	67.00%	83.00%		
Cumulative Approval rate						32%	
Discount rate	$1/(1+a)^0$	$1/(1+a)^{2.3}$	$1/(1+a)^{2.7}$	$1/(1+a)^{2.9}$	$1/(1+a)^{1.2}$	$1/(1+a)^6$	
proNPVdev.	5	5.4	4.9	35.6	2.2		
rNPVrev.						70.6	
rNPVtotal			$70.6-(5+5.4+4.9+35.6+2.2)$				17.5

In the case of the total development period, it is grasped that new drugs and biopharmaceuticals differ from each other, and success rates are similarly different. The total development period took 100 months from 1970 to 2008, but it is understood that the development period has been drastically decreased after 2014. This suggests that the approval period is significantly reduced since the establishment of the PDUFA in the mid-1990s.

In addition, although the overall development process of biopharmaceuticals and new substance drugs is the same, there is a difference in the optimization due to the difference of raw materials at the stage of discovery, and the clinical development of biopharmaceutical is grasped that it takes a long period of time.

Research limitations/ Implications: Contents

Given the obligation to report the results of clinical trials on P4 essential to FDA after approval by FDA, considering the fact that the ratio to market launch is applied to the rNPV variable model all at once, It is thought that it is necessary to newly develop an rNPV approval rate variable model to apply it subdivided into the first market launch rate (1.2 years after FDA approval) and secondary market launch rate (P4 approval rate).

KEYWORD: r-NPV, Clinicaltrials Development Period, LOA, POSReference

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External Knowledge Search Strategies and Innovation Performance

A Mediated Moderation Analysis on the Relationship of External Knowledge Search Strategies,
Organizational Ambidexterity, and Internal Assets

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Abstract

Purpose/ Research Question:

Although the studies on organizational ambidexterity argue that maintaining a balance between explorative and exploitative innovation (hereafter referred to as '*balanced innovation*') is essential for firms' superior performance (Atuahene-Gima, 2005; Tushman & O'Reilly, 1996; Ye et al., 2018; Robbins, 2018), they have not provided consistent findings on its strategic antecedents. Thus, the first goal of this study is to identify strategic antecedents that influence *balanced innovation*. For this purpose, we focus on the two different characteristics of firms' *external knowledge search strategies*: search depth and search breadth. The second goal is to provide an empirical evidence for the proposed argument that combination effects of the two *external knowledge search strategies* on firms' innovation performance would be mediated by *balanced innovation*. The final goal of this study is to examine the effects of internal complementary assets on the relationship between combination of external search strategies and *balanced innovation*.

Key Literature Reviews

While prior research attributed the lack of findings on differential effects of a *balanced innovation* on performance to the conflicting pressures that arise from pursuing fundamentally different activities '*within organization*' (Raisch & Birkinshaw, 2009), some research identified different modes of balance - achieving '*the balance across organization*' by externalizing either exploitative or explorative activities (Kim et al., 2018; Lavie & Rosenkopf, 2006; Rothaermel & Alexandre, 2009). However the empirical evidence for *balance across organization* remains still scarce (Lavie et al., 2010; Petruzzelli, 2014). Moreover, some empirical findings reveal that *balance across organizations* has negative effect on firms' innovation performance (Kim & Yoo, 2018) on account of 'Not Invented Here syndrome' - internal resistance to external knowledge.

Meanwhile, a different strand of literature, open innovation that focuses on firms' external knowledge search strategies and their innovative performance classified them into two distinct dimensions: exploratory and exploitative knowledge search strategies which lead to different levels of novelty in their innovation respectively (Chiang & Hung, 2010; Tani et al., 2018). Although this argument implies that firms need to pursue both types of external search strategies simultaneously to achieve ambidexterity (Laursen & Salter, 2006), their interaction effect has rarely been investigated.

Another limitation is that most of extant literature investigates direct relationship between external search strategies and their performance (Foss et al., 2011). Deep and wide relationship with external actors is not a sufficient condition for improving innovation performance (Ferrerias-Méndez et al, 2015). Firms therefore need to strengthen their internal complementary assets to successfully commercialize external knowledge they acquired (Han, 2017; Teece, 1986).

Design/ Methodology/ Approach:

For 612 Korean innovative manufacturers extracted from the National Innovation Survey and KIS Value, a commercial financial database, we first hypothesize that firms pursuing high levels of both external search depth and breadth are more likely to achieve higher innovation performance (market shares of new products). This is denoted as (1) in the research model shown in the figure 1.

Thereafter, we test an ambidexterity hypothesis that firms pursuing high levels of both search strategies are more likely to achieve *balanced innovation*, denoted as (2), which in turn enable them to achieve higher innovation performance, denoted as (3) (mediated moderation).

Further, we test the hypothesis that firms’ internal complementary assets positively moderate the impact of high levels of both search strategies on innovation performance through *balanced innovation*. More specifically, the mediated moderation effects would be stronger among firms with a higher level of complementary assets than among those with low level. These relationships are denoted as (4).

For estimating conditional indirect effects in our mediated moderation models which include two and three way interactions analyses, we used PROCESS macro, an OLS regression-based path analysis modeling tool.

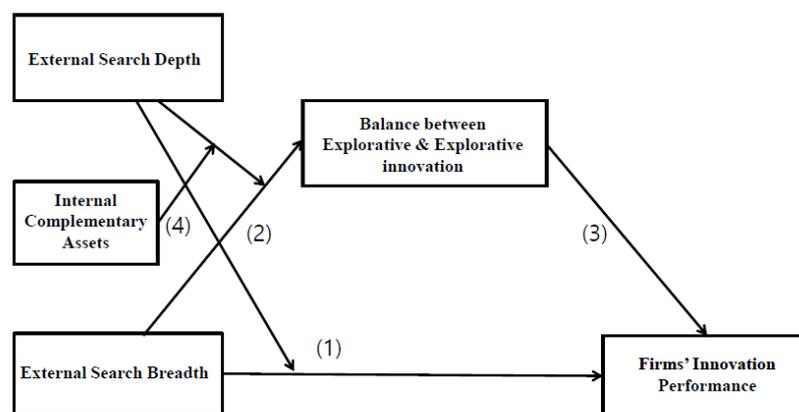


Figure 1. Research Model

Findings/Results

First, we found a positive interaction effect of external search depth and breadth on innovation performance.

The results of mediated moderation analysis further indicate that the positive moderation effect of the two search strategies on innovation performance is partly mediated by *balanced innovation*. This implies that the pursuing high levels of both search strategies can be an antecedent of achieving *balanced innovation*.

We also found strong support for the argument that the mediated moderation effects of the two search strategies on innovation performance through *balanced innovation* are contingent on the level of firms’ complementary assets. More specifically, the mediated moderation effects on innovation performance exist in firms with higher level of complementary assets, but not in firms with low level. The results provide the evidence that firms need to strengthen not only deeper and wider relationship with external actors but also internal complementary assets to achieve *balanced innovation* which leads to superior performance.

Research limitations/ Implications

Prior research on the antecedents of a balance between explorative and exploitative innovation has produced

inconsistent evidence because most studies examined the balance ‘*within or across organizations*’. Our main contribution to theory is to suggest a mutually beneficial relationship between firms’ external search depth and breadth as a strategic antecedent of organization ambidexterity (*balanced innovation*), building bridges between literature on organizational ambidexterity and open innovation.

To further advance theory, we supplement firms’ internal ability to commercialize external knowledge by highlighting a role of complementary assets that foster *balanced innovation* along with external knowledge search strategies. These findings provide important implications on extant literature on inter-organizational ambidexterity arguing need for balance across organizations.

Keywords: external search strategies; organizational ambidexterity; balance between explorative and exploitative innovation; complementary assets

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Supplier, Tailor and Facilitator: The Typology of Platform Business Model

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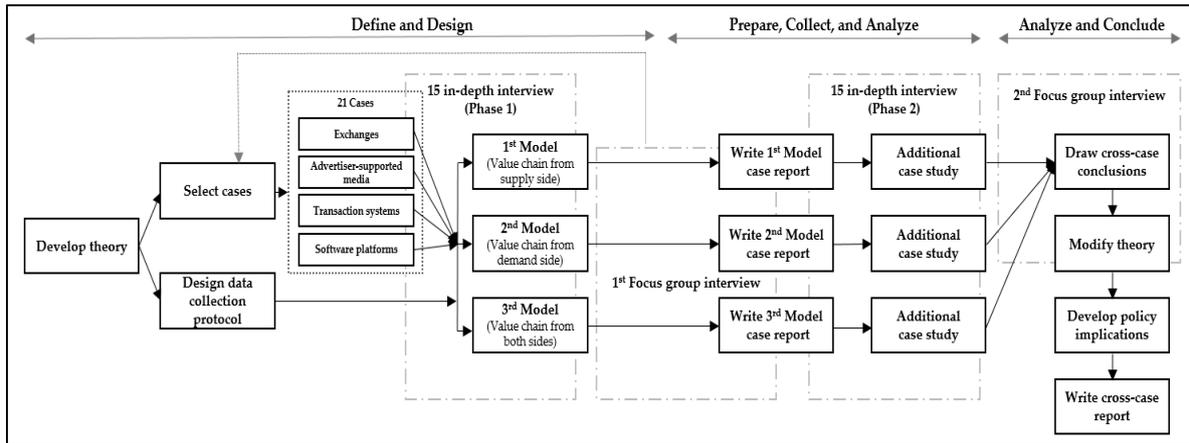
Abstract

In modern business, companies are confronted with various environmental changes to sustain their business, such as market structures, competitive advantages, public policies, and even technological foresight (Miles, 2010). And platform business, explained originally by the theory of Two-sided Markets (Evans and Schmalensee, 2010; Parker and Van Alstyne, 2005; Rochet and Tirole, 2003), has taken center stage as the newest value chain development in order to overcome the changes and grow sustainably. This research is a design aimed at strengthening corporate competitiveness with the value chain development and open innovation tool (Gawer, 2014; Kim, 2014). It builds market momentum (Gawer and Cusumano, 2008) and enables adaption to unanticipated changes in the external environment. Nevertheless, there have not been any systematic studies that analyze the platform value chains and value streams.

For a right understanding of this platform business, it is crucial to analyze that how the value chain and value stream are changed in the platform business model in order to explore value chains and value streams in the two-sided market, which has a distinct group of users on both sides. Because the platform has a distinct group of users on each side, value moves from both the left and the right, and this value chain change is an important feature in the two-sided market. Value chain features prominently in development business aimed at stimulating economic

growth and sustaining the competitiveness of the corporate business (Humphrey and Navas-Alemán, 2010; Cooke, 2017). Especially, value chain is the most unique and crucial elements in ICT and e-business (Amit and Zott, 2001; Ceccagnoli et al., 2012; Timmers, 1998). It disaggregates a corporate into its strategically relevant activities to understand the existing and potential sources of differentiation (Porter, 1985). An analysis of value stream is important for the understanding of value chain development (Bi et al, 2016; Hines & Rich, 1997). Therefore, guides for value chain are crucial analytical tools to develop and sustain the platform business on behalf of platform providers and stake holders, such as contents providers and consumers (Gawer and Cusumano, 2014; Kim, 2018). Because previous researches do not analyze how the value chain and stream are changed in the platform business model, however, this study aims to first examine which types of platform business models exist; this depends on the value chain, which is the essential element of the sustainable business for platform corporates.

Theories and methodologies strongly support a research project by allowing a study's validity to be evaluated. Systematically designed research challenges old beliefs and produces new theories. For this reason, research must be based on logical and systematic procedures. The overall objectives of this research are here presented with an understanding of the specific research enquiries that manage the conceptualization of the research. The methodological research rationale will be investigated, including the epistemological and philosophical presumptions that constitute the origin of the research questions. Thus, the aim of this research is to explore value chains and value streams in a two-sided market, which has a distinct group of users on each side.



Source: Author's Elaboration based on Yin (2009)

Figure N Data collection and multiple-case study analysis process

Hence, this study will proceed to develop a conceptual framework that integrates the most relevant features of value chains and streams in the platform business. In this study, the concept model is advanced by analyzing the previous researches first and brainstorming about value chains and streams in the platform business. Because there is a variety of value streams and creations due to the nature of two-sided markets (Kim, 2014), and understanding value chains is an important element of competitive advantage strategies (Porter, 2008; Teece, 2010). This is the area in which this study intends to make a research contribution by illustrating how various value chain changes in platforms have distinct implications for different types of the platform business. It has done a cross-case synthesis through the conducting the in-depth interview as well as document analysis sequentially in two phases and brought a conclusion which suggests three core models.

Keywords; value chain; platform; two-sided market; open innovation; value streams

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Linking Research and Education in Undergraduate School

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Abstract: Our main interest in this talk is the education model in DGIST that links the research and education. We try to give an analyzing framework for the education model combining the education in undergraduate school with the research. As a result, we claim flexible and diverse models are necessary and have to make an educational environment to promote diverse models.

Purpose/ Research Question: It was indicated that research is a necessary component of the bachelor's degree education [7] and it has been believed that the research-based learning is preferable than the teacher-based learning [5]. Also, the higher education has been transformed into the emphasis of research experience following the tracking of undergraduate education in US [1, 6]. Apart from these claims and *a priori* supreme truth, undergraduate research is always controversial [4]. In [8], the undergraduate research was mentioned as "just glorified homework" and "there is considerable pressure on universities to offer undergraduate research programs to more effectively recruit the best high-school seniors." Another authors claims [9] "university research often detracts from the quality of teaching" In [4] the authors showed that students with research experience are more likely to pursue graduate degrees and in [2], 30% of researchers with more than a year of research experience reported that they expected to obtain a Ph.D., compared with only 13% of those with less than half year of research experience and 8% of those with no research experience. Apart from the controversial debates on undergraduate research, we want to focus on our institution DGIST. The main characteristics of DGIST are the following:

- 1) one department, that is, there is no department;
- 2) diverse interests of students;
- 3) the undergraduate and graduate schools are separated somehow;
- 4) it is well-known that the primary allegiance of professors is to their subject or profession, and their sense of themselves as staff at a given institution is secondary. But on the contrary, the situation is in DGIST.

One of the most important educational goals of School of Undergraduate Studies in DGIST is UGRP (undergraduate group research project). Nevertheless, the linkage between the education and

research is not well established. Now we have the most important question what kind of education model is the best one in DGIST and which kind of curriculum structure and undergraduate research program is the most suited model. There are many difficulties when we link the research and education in undergraduate education, especially. We list here expected difficulties:

- 1) The viewpoint on the linking of research and teaching varies between disciplinary space [1].
- 2) Research experience of undergraduate student more than 12 months during semester
- 3) Disadvantages of working in a Group project like unequal participation, intrinsic conflict, no individual thinking
- 4) Lack of knowledge or skill on the subject

Key Literature Reviews (About 3~5 papers):

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Design/ Methodology/ Approach: Most professors tends to think that their research findings are integrated into their lecture courses. We must conceptualize research-teaching link, categorize it by disciplinary space [1], and analyze their nature.

- 1) Hard pure (for example, physics), soft pure (for example, history), hard applied (for example, engineering), and soft applied (for example, education)
- 2) Considering of the dimension of curriculum design [1]
 - 2.1) the emphasis is on research content or research processes and problems
 - 2.2) the students are treated as the audience or participants
 - 2.3) the teaching is teacher-focused or student-focused
- 3) We must study cases In US Liberal Arts College, especially undergraduate researches in Harvey-Mudd College, and Olin College

(Expected) Findings/Results: There is no one fixed mode. We need very flexible and diverse models and we have to develop an environment to promote diverse and effective model suited to DGIST.

We need a basic and fundamental courses right before starting research. In principle, the subject should be long term more than half and a year, transdisciplinary nature. Students participating research should encounter certain difficulty like a wall and experience to overcome such difficulty. This process enables students to enhance the creativity thinking. We suggest the following typical models.

- 1) More than 1.5 years lasting research program in group (standard)
- 2) Independent studies
- 3) Self-organized course
- 4) Undergraduate Thesis
- 5) Long term study abroad, or long term internship

Research limitations/ Implications: Hard to prove the effectiveness. ## Revise this part later.

Keywords: undergraduate education, undergraduate research, research-based education, UGRP(undergraduate group research project)

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The Effect of Design Competence on Science Education

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Recently, Design thinking method has been getting attention in many fields. It is used in developing new businesses, products and services, as well as methods of learning. Design thinking method is a way of finding a powerful solution through a process that people who have diverse expertise share or suggest their ideas, define, ideate, make some prototype and then evaluate within a short time.

Science and Engineering ideas and research results are also made into products and services through the design process. Moreover continuous design management can create new needs and values.

Therefore, comprehension and application of “design thinking” can be a necessary competence in Science Education.

At DGIST, we aim to understand the basic knowledge about design thinking and cultivate their abilities such as Observation and Empathy ability, Creative thinking ability, Expression and Presentation ability through the Design thinking class. Design thinking class looks difficult for freshmen in the beginning because they don't have any experiences anywhere yet. However, as they proceeded with the project, the participants in the first semester began to understand why design is needed, what the design role is, and gradually discovered their own creativity potential and expressive power for each area. Moreover, I have observed that their abilities improved in this class.

Hence, I would like to show how the students' three abilities changed when they used or applied the process of design thinking and student survey.

Keywords : Design thinking, Design Competence, Observation and Empathy ability, Creative thinking ability, Expression and Presentation ability

Reference:

From Design Thinking to Art Thinking with an Open Innovation Perspective—A Case Study of How Art Thinking Rescued a Cultural Institution in Dublin

by Peter Robbins,

J. Open Innov. Technol. Mark. Complex. 2018, 4(4), 57; <https://doi.org/10.3390/joitmc4040057>

Creativity in Business Education: A Review of Creative Self-Belief Theories and Arts-Based Methods

by Sogol Hodayoun and Danah Henriksen

J. Open Innov. Technol. Mark. Complex. 2018, 4(4), 55; <https://doi.org/10.3390/joitmc4040055>

Arts catalyst of creative organisations for the fourth industrial revolution

by Giovanni Schiuma

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**The efficient collaboration strategy of US Pharmaceutical Companies in regional
innovation system**

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Abstract

Purpose/ Research Question: The regional innovation system (RIS) is critical as a government policy to foster companies by establishing an efficient ecosystem for organically collaborating within the cluster. In Western countries, some renowned regional innovation systems are generated spontaneously by industries themselves, e.g. Silicon Valley and Route 128 in the United States, and Cambridge in United Kingdom (Su & Chen, 2015). Traditionally, pharmaceutical industry is considered as a system or network (McKelvey & Orsenigo, 2001). The most representative pharmaceutical clusters in the United States are the California cluster and the Boston cluster. Quantitative analysis of the factors that make up this performance based on the deal information was little, even though studies have tried to measure the performance of RIS (Lopes et al., 2018). Since the pharmaceutical industry is a patent-based industry, it has a high R & D proportion for technology development. A sectoral system has a specific knowledge base, technologies, inputs and demand. Agents are individuals and organizations at various levels of aggregation. They interact through processes of communication, exchange, co-operation, competition and command, and these interactions are shaped by institutions (Malerba, 2002). As Hu & Hung, 2014 analyzes pharmaceutical company in the perspective of sectoral system of innovation, this study tries to suggest the efficient policy for the R & D cooperation at each RIS stages.

The purpose of this study is to examine how two clusters collaboration is changes depending on RIS stages, and

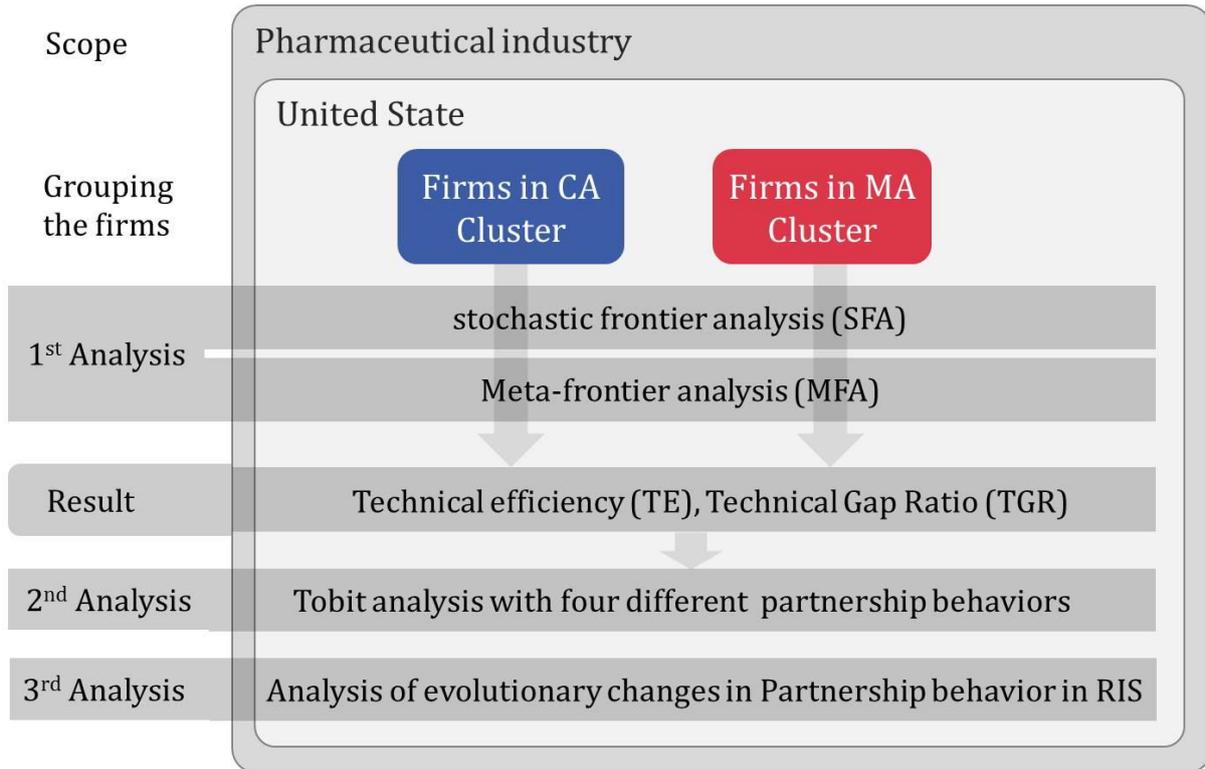
how this change in collaboration affects the productivity of two clusters. First, productivity is calculated by SFA and Meta-frontier analysis for each company and cluster. First, this study divides four collaboration (Partnership) structures of California cluster and the Boston cluster from 2001 to 2016 which are RIS stages (Early (Research) stage or Late (Development) Stage) and Inner or Outer cluster partnership) and seeks to characterize the partnership behavior at each stage. Thirdly, this study examines the impact of the partnership structure on the productivity of firms using tobit analysis. Therefore, this study tries to find out whether cooperation between two companies in RIS enhances the efficiency of the company more than the internal company of RIS in cooperation with external companies in each two stages.

Key Literature Reviews (About 3~5 papers): The emergence of the regional innovation policy is a result of more than 40 years and is now attracting attention as an innovation in economic development (McCann & Ortega-Argiles, 2013; Yun et al., 2016, Yun et al., 2015, Kim & Kim, 2018).

RIS is an influential concept in the context of a regional science study that has been on the rise since the mid-1990s (Belussi et al., 2010; Cooke et al., 2004). Spatial proximity and social embeddedness are locally rooted advantages (Belussi & Sedita, 2009; Cooke et al., 2004). Previous RIS studies have emphasized local sources, but in fact, global companies are emerging by leading knowledge transmission within RIS (Owen-Smith and Powell, 2004). The RIS strength is overcoming the limitations of a single firm and emphasizing the advantages of spatial proximity by supporting the building the ecosystem to collaboration. In order to maximize the advantages of RIS, it is necessary to understand and support the collaboration that increases the efficiency of the enterprise across RIS development stage.

Design/ Methodology/ Approach:

In the pharmaceutical industry, the United States is regarded as a double axis with Europe, accounting for one-third of the total pharmaceutical market, and most biopharmaceutical companies are in the United States. This study analyzes the productivity of eastern Massachusetts and western California, which have the highest degree of RIS. More than 1,500 US pharmaceutical companies from 2001 to 2016 were analyzed by MFA. The analysis is consisted of three stages as follows.



Methodology 1: Analysis of clusters' productivity using SFA and MFA.

This step analyzes the productivity of eastern Massachusetts and western California across RIS development stage by use of the stochastic frontier analysis and meta-frontier analysis.

The efficiency of each group is measured by stochastic frontier analysis (SFA), and the efficiency comparison between the groups is made using meta-frontier analysis (MFA).

SFA estimates technological efficiency using the frontier production function, which represents the relationship between input and output factors as a production function and represents the maximum output relative to input. Technical efficiency (TE) shows the relative technology level of a given firm's actual production compared to the frontier production function. The further away the technological level of the company is from the frontier production function, the less efficient the company is.

In this study, we use the SFA model based on Battese & Coelli (1992) to measure the efficiency (Battese & Coelli, 1992).

TE_{it} , TE of firm i at time t is given by the following equation (1):

$$TE_{it} = e^{-u_{it}} = \frac{Y_{it}}{f(X_{it}, \beta)e^{v_{it}}}, i = 1, 2, \dots, N, t = 1, 2, \dots, T \quad (1)$$

In particular, assuming a random effects time-varying production model and assuming a production function of the translog form:

$$\ln Y_{it} = \beta_0 + \sum_{m=1}^3 \beta_m \ln x_{mit} + \sum_{m=1}^3 \sum_{k \geq m}^3 \beta_{mk} \ln x_{mit} \ln x_{kit} + V_{it} - U_{it} \quad (3)$$

where x_{1it} represents the amount of capital (K) at time t of the i th firm, x_{2it} represents the amount of cost (M) at time t of the i th firm, and x_{3it} represents the number of employees at time t of the i th firm. In this study, total capital stock is used for K, other expenditures is used for M, labor is used for L, and net sales is used for output Y.

Moreover, we use a meta-frontier production function that wraps the production function of all groups to compare the efficiency levels of other groups operating under different technical conditions (Battese & Rao, 2002). MFA has recently been applied to various industry analysis including the information and communication technology (ICT) industry (e.g., see Yang et al., 2013; Kim et al., 2018).

Methodology 2: Tobit analysis of how the structure of corporate partnership behavior affects the productivity of firms

Methodology 3: Analysis of evolutionary changes in partnership behavior in different RIS stages.

(Expected) Findings/Results: The efficient collaboration strategy would be different at the RIS development stages. And the internal cooperation in the West, where Silicon Valley is the mainstay of IT companies, is expected to be more efficient than East.

Research limitations/ Implications: Because this study is a state-based analysis, the result is not from the pinpoint the RIS region. However, this research contributes to identify the collaboration strategy for the companies at each RIS development stages.

Keywords: regional innovation system, productivity, internal/external RIS collaboration, RIS development stage

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**The impact of social capital on US pharmaceutical innovation cluster
performance**

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Abstract

Purpose/ Research Question:

As a successful regional innovation leads regional economic growth, the studies have been conducted to identify the hospitable environment for supporting the innovation. Since entrepreneurial culture is important in promoting regional economic success (Hoselitz 1957), efforts have been made to formally model the role of entrepreneurs (Lucas 1978; Kirzner, 1997). Economists have been studying the effects of entrepreneurship rather than measuring entrepreneurship, and social psychologists have studied the origin of entrepreneurship. However, there is a problem that entrepreneurial culture is difficult to measure when conducting an empirical study. In order to measure entrepreneurship, not only the social psychological literature should be approached (Cromie, 2000) but also the effect of entrepreneurship should be approached based on an economic growth literature (Barro, 1991; Yun et al., 2016; Yun, 2015).

The regional innovation system (RIS) strength is overcoming the limitations of a single firm and emphasizing the advantages of spatial proximity by supporting to establish the ecosystem for collaboration. Social capital (SC), which is based on the social trust, activates regional economic development (Hamidi et al., 2018; Pihkala et al., 2007). SC is usually measured based on the personal perceived survey so that SC was measured as one-way trust. However, social capital can maximize the impact as two-way. Collaboration represents two-way trust. In this study,

collaboration intensity is a proxy for SC.

The purpose of this study is to identify the entrepreneurial culture and SC that activates regional development.

Key Literature Reviews (About 3~5 papers): RIS is an influential concept in the context of a regional science study that has been on the rise since the mid-1990s (Belussi et al., 2010; Cooke et al., 2004). For a successful regional innovation, the culture of the region itself is important. Non-linear social processes resulting from several actors and factors lead to evolutionary theories of economic (Edquist, 2006). Previous studies insisted the importance of entrepreneurial culture in RIS (Beugelsdijk, 2010; Stuetzer et al., 2018). Entrepreneurial culture is one of important environment but the economic development should be considered for the successful RIS. Thus, this study considers not only the entrepreneurial culture but also the factors that can lead RIS to be succeeded. Beugelsdijk (2007) shows the relationship among entrepreneurial culture, regional innovative and economic growth by measuring the entrepreneurial culture with the survey to identify the entrepreneurial culture based on the entrepreneurs characteristics. Of the factors affecting RIS, education level shows the effective effects on entrepreneurship (Lopes et al., 2018). In addition, as the entrepreneurial culture, higher entrepreneurial culture leads to higher employment growth and eventually to regional economic performance (Stuetzer et al., 2018).

In addition, SC is considered as an important factor for regional development (Hamidi et al., 2018; Pihkala et al., 2007). SC can be considered as trust for collaboration between firms in RIS.

Design/ Methodology/ Approach: In order to see the factors that increase the efficiency of RIS, it is necessary to compare the RIS region with the region where global companies exist but not RIS. In relation to Bio industry, this study compares three states including the highest degree of RIS, Massachusetts and California, and New York (Shin et al., 2018; Shin et al., 2018).

Ordinary Least square (OLS) would be used to analyze the efficient RIS strategy. There are one dependent variable and two independent variables, which are variables of environment and open innovation (Table 1). As Entrepreneurship culture variables, the level of education and employment in the area and the number of start-ups and the number of closed-offs in the area are taken into account. As SC variable, collaboration intensity would be the proxy for the social capital based on the collaboration types (Partnership / M&A / Licensing). The proportion of the bio industry performance in the regional economic performance is considered as an economic dependent variable.

Table 1. Dependent and independent variables

	Group	Variables	Descriptions
Independent variables	Entrepreneurship culture	Labor environment	# of employments
		Education environment	# of high level workforce?

		Entrepreneurship environment	# of bio start-ups
	Infrastructure	Infra (Facilities / IT Infra level)	Infra level
	Institutional Capital	Funding	VC funding / NIH funding
	STI	R&D expenditure	R&D expenditure (Public / Private)
	Social Capital (SC)	Social Trust	Collaboration intensity
dependent variables	Economic	pharmaceutical industry growth	The proportion of the pharmaceutical industry performance

(Expected) Findings/Results: The higher the degree of education, the higher the employment, the higher SC, the better the performance of the bio industry in the region.

Research limitations/Implications:

This study emphasizes the importance of establishing an entrepreneurial environment rather than focusing only on specialized industries. Furthermore, this study measures SC with the collaboration intensity. However, this study has some limitations. First of all, the individual characteristics as the entrepreneur are not considered in this study. More variables can be considered as the environment variables besides the factors in this study.

Keywords: regional innovation system, social capital, entrepreneurial culture, innovation, regional growth

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**How Can Governments Facilitate Growth in the Private Sector?
An Empirical Study of Government Support and
Firms' Innovation Performance in Korea**

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Abstract: This study empirically examines the relationship between government support policies and firms' innovative activities. Specifically, we analyze how continuity (or discontinuity) in the presidency has differential implications for manufacturing and service firms in Korea. We also examine how the effect differs between export-oriented and domestically-based firms. We use the Korean Innovation Survey data which provides firm-level panel data on firm characteristics, innovative activities, and government support. We expect to find differential effect of government policies on firms by the government continuity status, industrial sectors, and firms' market orientation. This work is expected to contribute to the literature by providing evidence based on rich firm-level panel data to address the important topic of firm innovation, which will have wider implications regarding public-private dynamics, economic growth, and job creation.

How can governments facilitate firms' innovative activities? In other words, what is the relationship between government support policies and firms' innovative activities? Specifically, we address the following questions:

- **Are government support policies more effective to promote innovation in firms when there is a continuity in the presidency?**
- **Does the effect differ by industrial sector (e.g., manufacturing firms, service firms)?**

- **Does the effect differ by firms' market orientation (e.g., export-oriented, domestic-market-based)?**

Literature Review:

- Innovation is a key component of firm activities which involves complex and dynamic interaction among varying innovative activities and firm performances.

Lee et al. (2018), Della Corte (2018), and Leydesdorff (2018) show that innovation is key to success in the concurrent fourth industrial revolution era.

Yun et al. (2017) examines the relation between innovation and firm performance and find that, in addition to the observed inverted U-curve relationship, various factors come into action (i.e., open innovation strategy, specific industry, time scope).

Widya-Hasuti et al. (2018) find that practices of process innovation are associated with sustainable innovation within Indonesian firms.

- However, existing studies show contrasting evidence on the relationship between government support policies and firms' innovative activities.

Doh and Kim (2014) use firm-level panel data for 47 small and medium-sized enterprises (SMEs) in the Gyeongbuk province for 2004-2009 and find a positive relation between the Korean government's technological development assistance fund and SMEs' patent acquisition and new design registration activities.

Guan and Yam (2015) find that the Chinese government's financial support during the economic transition period of 1990s had no or even negative effect on the manufacturing firms' innovative economic performance (i.e., patent acquisition).

Design & Methodology

This research is based on quantitative research methods and employs regression models on panel datasets that include 8,000 manufacturing and service firms for each wave.

- The Korean Innovation Survey data provides firm-level panel data on firm characteristics, innovative activities, and government support that allow us to compare results by year, industry, and export status.
- While examining various measures of innovation (e.g., product, service, process,

organizational, and marketing innovation), we use various regression models as needed (multiple OLS, Logit, Poisson) and control for firm characteristics (e.g., firm size, industrial classification, region, human capital).

Expected findings

We expect to find differential effect of government policies on firms by the government continuity status, industrial sectors, and firms' market orientation. Specifically, we hypothesize that:

- Government support policies are more effective in enhancing firm innovation when there is consistency in the government and presidency.
- Government support policies have greater effect in promoting product innovation than other types of innovation (e.g., process, organizational).
- Government support policies have greater effect on manufacturing firms than service firms.
- Among large firms, government support policies have greater effect on export-oriented firms than domestic-market-based firms.
- Among small and medium sized enterprises, government support policies have greater effect on domestic-market-based firms than export-oriented firms.

Implications

This work is expected to contribute to the literature by providing evidence based on rich firm-level panel data to address the important topic of firm innovation, which will have wider implications regarding public-private dynamics, economic growth, and job creation.

Keywords: government policy, firm innovation, R&D, Korea

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71.

**Detecting themes of public concern:
focus on immigration policy by text mining analysis**

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<Abstract> Purpose/ Research Question

- Changes in the social environment of refugee issues
 - Diplomatic and international issues → Social and humanitarian issues

- Increased social conflict such as arguments for and against refugee permits
- Increase in the number of refugee applicants: 1,143('12) → 9,942('17)
- Emergence of refugee issue in Jeju Island and growing of social concerns
 - A large number of Yemen refugees came to Jeju Island where they can stay without a visa, and they applied for refugee protection in Korea for political reasons → 361 out of 481 people received humanitarian status instead of refugee status.
 - Due to the sudden increase in the number of refugee applicants, negative social opinions such as anti-Muslims and anti-refugees appear in society
- Influence of media on refugee issues
 - There is a difference in viewpoint of refugee problem according to media → Changes in the evaluation of government capacities and social awareness according to the framing of the press
 - Analyzing trends in media reporting on refugee issues in terms of framing

Key Literature Reviews (About 3~5 papers):

- The news produced by the media is not only produced by a certain framework of recognition but also constitutes a social reality by providing a 'frame' of reality → Social Constructionism(Gans, 1979; Epstein, 1974; Tuchman, 1978).
- The impact of media framing on individuals and groups in society: In the interaction of news messages and the active meaning of the audience, the framing can determine the specific meaning to be delivered to the

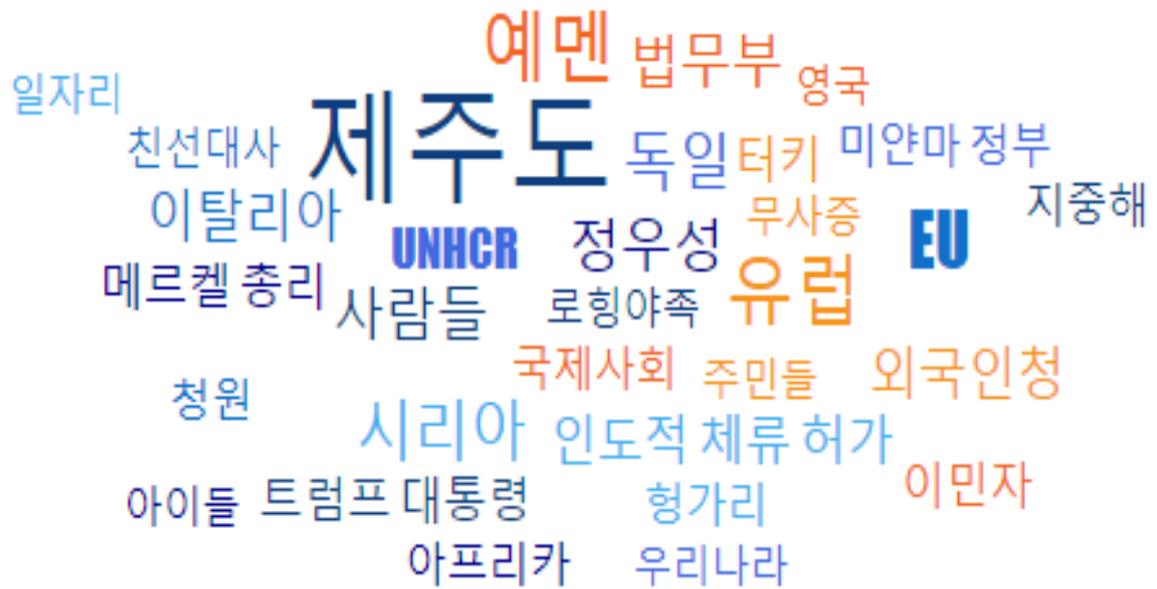
audience → framing effect(Pan & Kosicki, 1993; Scheufele,1999).

- Using the data mining as a means to analyze public perceptions
 - Text mining can be used to understand and interpret unstructured data generated from online news, and to analyze public comments and evaluations of certain objects.
 - There are researches such as analysis of finance news to confirm market recognition(Koppel & Shtrimberg, 2006; Alvim et al., 2010).

Design/ Methodology/ Approach

- In order to analyze the differences of the frames according to the media, we collected and analyzed the entire articles on the refugee problem using the five major daily newspapers which were mainly adopted in the previous research such as Chosun Ilbo, Korea Joongang Daily, Dong-A Ilbo, Kyunhyang newspaper, The Hankyoreh.
- The collection of the analysis data is using 'KINDS (www.kinds.or.kr)' service which is an article search database system of Korea Press Foundation.
- The analysis period is set for the last one year period (2017-2018).
- Analysis target: 2,004 articles related to refugees
 - "Chosun Ilbo" 288 articles, "Dong-A Ilbo" 255 articles, "Joongang Daily" 457 articles, "Kyunhyang Newspaper" 521 articles and "Hankyoreh" 483 articles(Analysis on Chosun Ilbo articles will be added separately later).

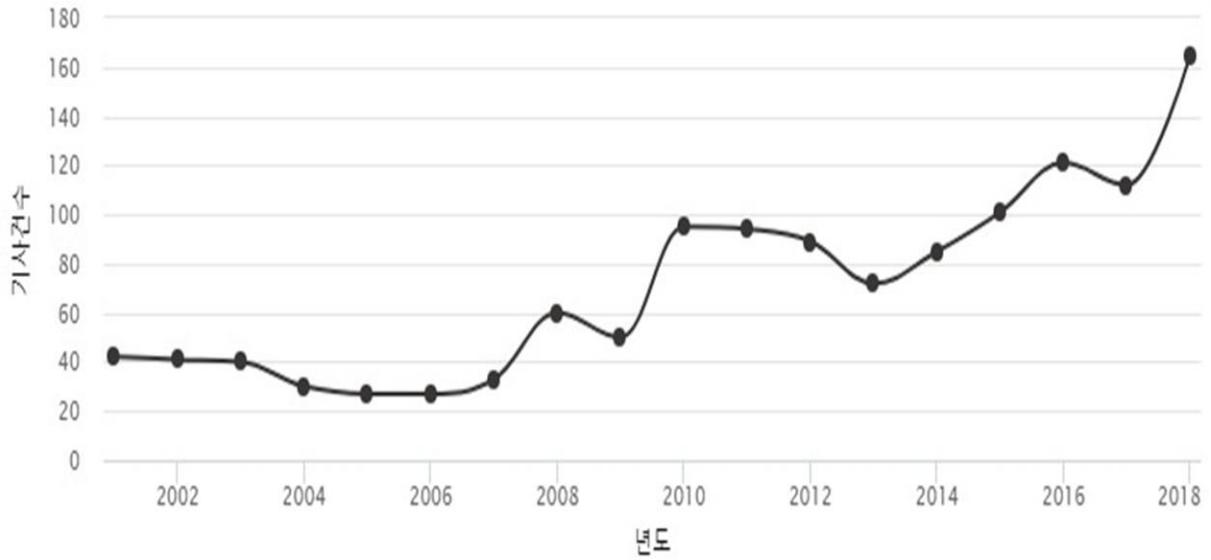
(Expected) Findings/Results



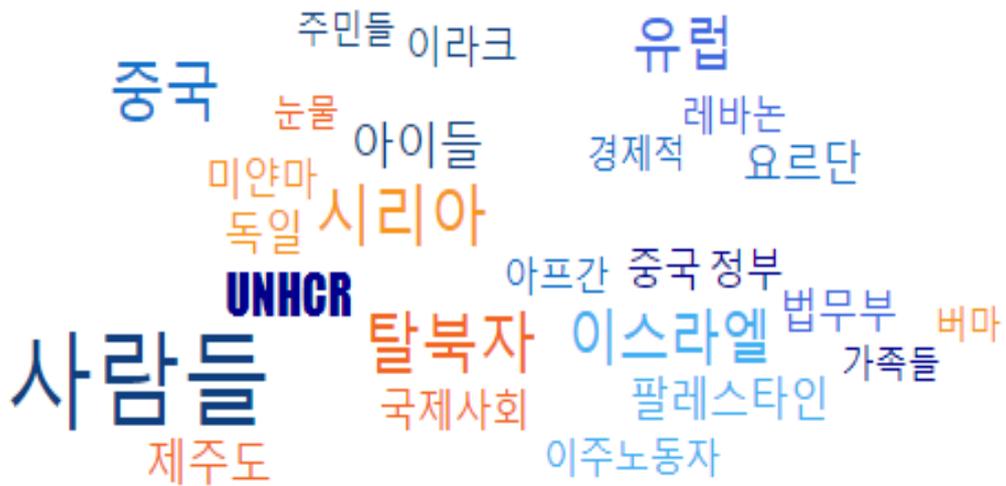
Dong-A Ilbo & JoongAng Daily (‘17-`18)



Hankyoreh & Kyunghyang (‘17-`18)



Hankyoreh & Kyunghyang ('01-'18) eports on refugee issues



Hankyoreh & Kyunghyang ('01-'18)

Research limitations/ Implications

- Implications
 - Analyze differences in framing aspects of refugee issues, according to media

- There were differences over refugee problem interpretation depending on political tendency.
- The media is required to maintain a neutral position on social issues so that the public can explore their own solutions
- Limitations
 - Identifying the relationship between the trend of media reporting and public perception → Analysis of people's perception through analysis of comments by media
 - Limitations of long-term approach → Extend the analysis period to more than 10 years for each media (e.g. Comparing before and after the enactment of the Refugee Law in 2012)
 - In order to enhance the accuracy and validity of the analysis, this studies, will add relevance analysis and network analysis, and to improve concrete interpretation based on the context in Korea.

Keywords: refugee issues, framing, text-mining

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Regional innovation by a public health nurse who started business in Japan

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Abstract

Purpose/Research Question:

The present study aimed to report on my practice since 2014 as one of the public health nurses who work independently and examine other such nurses' roles. Furthermore, the ways to increase the number of public health nurses were explored by identifying benefits of their activities based on the findings of the survey with them.

Key Literature Reviews (About 3~5 papers):

In the United States, healthcare expenditure has grown and will continue to increase¹⁾. In Japan, it has grown and will continue to increase, too. Health care is complex innovation eco-systems²⁾. Accordingly, it is important for public health nurses to deal with intensive daily life needs of local residents in Japan. Public health nurses who work independently and play a part in community-based integrated care are considered to have roles of providing a new type of health service based on actual conditions of local communities. In Japan where the aging society is progressing, healthy aging is important to achieve sustainable development goals³⁾.

Most public health nurses belong to organizations including local government institutions and private companies in Japan. However, there are public health nurses who work independently and do not belong to such organizations. No national survey has been conducted yet with these public health nurses in Japan. As of October 2018, 24 public health nurses who work independently were registered as members of the Japan Health Nurse Association. Specific activities of these public health nurses reported so far in Japan are: providing health training programs and consultation services⁴⁾ and readily available health checkup programs⁵⁾ and managing a town healthcare room for mothers⁶⁾.

As I have been working on the rental housing project for socially vulnerable people including those with mental disabilities for the first time in Japan, it is important for me to examine the contents of my activities. Moreover, it may be necessary to identify the benefits experienced by other public health nurses who work independently.

Design/Methodology/Approach:

The history of health and welfare policies for mentally ill patients is short in Japan. The independence and social participation of people with mental disabilities were stipulated when the

Mental Health and Welfare Law was legislated in 1995. Currently, as defined by the General Support Law for Persons with Disabilities Act, council meetings on ways to support independence of individuals with disabilities are held by the people concerned to facilitate the transition of people with mental disabilities from an institutional to community setting. However, people with mental disabilities who are discharged from an institution cannot find a room that they can rent. Therefore, I received financing from a bank and acquired rental housing for them. After that, I started the housing provision project with the cooperation of a real estate management company.

Semi-structured interviews were used in the survey of public health nurses who work independently. The survey investigated the benefits from these public health nurses' activities within five years of working independently, using a qualitative and inductive taxonomic method.

(Expected) Findings/Results:

I have rented out housing to ten socially vulnerable people so far. As I acquired some housing through change in ownership, the tenants lived in the house for a maximum of 28 years and minimum of three months. The conditions of households based on the tenants were as follows: elderly individuals living alone, mother-children households, people with mental disabilities, people with physical disabilities, elderly couple households, university students, multi-family households, and households receiving public assistance.

The findings of this interview survey indicated the following benefits of their activities within five years of working independently: "independent work pattern," "finding their activities challenging," "helping their clients and society," and "acknowledging their existential value."

Research Limitations/Implications:

All the intensive needs of local residents cannot be met by only utilizing the existing systems. Public health nurses who work independently should listen to various voices in the community and grasp local issues. Therefore, they play a role in creating a new service if necessary. The findings of this study suggested that they can play a role in solving the local issues.

Additionally, even during the first five years of their activities, four benefits were identified. In the future, it is desirable for public health nurses who work independently to actively engage in their business in Japan.

The limitation of this study is the small sample size because there are only a few public health nurses who work independently.

Keywords: Public health nurse who works independently, Challenging, Housing provision, Community-based integrated care

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Indirect effects of regulation on audit firms in Taiwan

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Abstract

This study investigates the indirect effects of regulation over tax agents on performance of audit firms in Taiwan. To be a professional, such as lawyers, doctor, or certified public accountants (CPA), you are required to take a uniform examination held by the Examination Yuan of Taiwan. After passing the examination, to obtain a license to practice, you are asked to join the related association such as Taiwan Certified Public Accountants Association. Over the past five decades, tax agents serve small and medium enterprises under the executive order issued by the Ministry of Finance and Ministry of Economic Affairs. Because of no uniform examination and license, tax agents are jokingly referred to as underground CPA. To establish a sound accounting and tax return filing system, Taiwanese Ministry of Finance drafted the regulation over tax agents and was approved by the Legislative Yuan, the 2004 Tax Agent Act.

Tax agents practicing before 2004 can either take the examination or participate annual professional training to qualify as a certified public bookkeeper (CPB). After 2004, taking the uniform examination is the only way to be a CPB. The passage of Tax Agent Act entitles tax agents to deliver services as a legal professional. The article 13 of Tax Agent Act stipulates the services which CPB can offer, including tax and consultation, corporate registration and accounting and bookkeeping. These services offered to small and medium enterprise by tax agents are also provided by CPA for the past five decades. To ease the subsequent analysis, we define the services that can be rendered by tax agents and auditors as overlapped businesses.

Before 2004, CPA provided services with a certified license but tax agents without the certification, leading to an inferior situation for tax agents in soliciting and expanding overlapped businesses. After 2004, the Tax Agent Act endowed tax agents a certified license, which will enhance their advantages in competing the above businesses with CPA. Under the landscape of operating environment, this study assumes that the passage of Tax Agent Act will benefit tax agents (CPB) but negatively affect auditors (CPA) in their provisions of overlapped businesses.

In terms of the businesses in an audit firm, the overlapped businesses are referred to as non-audit services. Beginning in the 1990s, auditors have begun shifting their human resources from traditional, low-margin revenue product area of audit into relatively new, high-margin revenue product area of non-audit. Thus, this study hypothesizes that overlapped businesses are positively associated with operating performance of audit firms. However, the Tax Agent Act endowed tax agents the legal professionals to enhance their competition with CPA for overlapped businesses. Tax agents possess the competitive advantages for their relatively lower service fees and easy service access by the clients. As a result, the provision of non-audit services in audit firms is negatively affected by the passage of Tax Agent Act,

thereby the lower operating performance of audit firms. Hence, we hypothesize that the operating performance of audit firms is lower in the post-act period than in the pre-act period. After the passage of Tax Agent Act, tax agents have an enhanced competitive advantage in soliciting and expanding overlapped businesses. We further assume that the degree of businesses contribution to operating performance of audit firms is lower in the post-act period than in the pre-act period.

According to the empirical dataset, Survey Report of Audit Firms in Taiwan, the overlapped businesses include six individual items: taxes planning service, tax administrative litigation service, other taxes service, management advisory service, corporate registration service and other services. Based on the Tax Agent Act, we group them into three categories, that is, tax and consultation, corporate registration, and accounting and bookkeeping. We define the years before 2004 as pre-act period and those after 2004 as post-act period.

The overlapped businesses are provided to small and medium enterprises by tax agents and auditors. In terms of market segmentation, audit firms are classified into three categories, small-sized, medium-sized, and large-sized firms. Small-sized firms, that is, proprietorship audit firms, are not allowed to render services to public companies. Their target clients are the same as tax agents. Thus, the Tax Agent Act directly impacts the proprietorship audit firms. Accordingly, we focus on the proprietorship audit firms to investigate the assumption of this study. Further, the operating performance of audit firms is defined as total net income of a proprietorship audit firm.

This study obtains empirical data of proprietorship audit firms from the 1989-2016 Survey Report of Audit Firms in Taiwan, published by the Financial Supervisory Commission. As the survey is administered pursuant to the Statistics Act, audit firms surveyed are required to fill out the questionnaire correctly within the due time. Thus, the Survey Report reveals an annual response rate of over eighty percent.

After multiple regression analyses, this study obtains the following results. The operating performance of audit firms in the post-act period is significantly lower than that in the pre-act period. Total overlapped businesses are associated with operating performance of audit firms. But the contribution degree of overlapped businesses to operating performance is higher in the post-act period than in the pre-act period. For the three categories of overlapped businesses, tax and consultation, corporate registration, and accounting and bookkeeping are positively and significantly related to operating performance. The contribution degree of tax and consultation to operating performance is lower in the post-act period, but that of corporate registration, and accounting and bookkeeping is higher than in the post-act period. For the six individual items of overlapped businesses, taxes planning service, tax administrative litigation service, other taxes service, management advisory service, corporate registration service and other services all are positively and significantly associated with operating performance. Furthermore, the operating performance contribution degree of other taxes service, management advisory service, and other services is higher in the post-act period. However, there are insignificant differences in the operating performance contribution degree of taxes planning service, tax administrative litigation service, and corporate registration service between pre-act period and post-act period. In sum, the empirical findings are consistent with some of our hypotheses and contribute practical implications to the auditors.

Keywords: Tax Agents, Auditors, Non-audit Services, Operating Performance, Proprietorship Audit Firms

Regional innovation by new type leapfrogging

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Abstract

Purpose/ Research Question:

Japan Policy Council which was founded by Japan Productivity Center as a private meeting committee structure indicated that the disappearance possibility of 896 municipalities were expected caused by the depopulation with the declining birth rate in Japan. Is the viewpoint that Japanese local district is unidirectionally declining correct? This is the core question in this study. We are performing the study on the local community in Mie prefecture, Japan, during over 10 years. According to our research, we reached the point of view that "the extinction possibility of the local government" and "the drop of the vitality in region" do not have correlation. In Mie prefecture, there is a North-South economic gap to be caused by the long terrain from north to south. The northern part of Mie prefecture is mainly based on secondary industry and the southern part is based on primary industry. The population is biased toward the north. The citizen income per person is more than twice in the northern part compare to the southern part. Rapid depopulation and aging are progressing in the southern part of Mie prefecture. The possibility that the southern municipality will disappear is felt strong. On the other hand, carefully looking at the southern part of Mie prefecture, it has been confirmed that there is a business model that is conducting a strong business even if an old company in the area.

Key Literature Reviews (About 3~5 papers):

1. Papers showing the actual situation by leapfrog type economic development¹⁾.
2. Papers showing the actual situation on the growth and steady process of the Japanese economy²⁾.
3. Papers showing economic situation and social real situation in rural areas in Japan³⁾.
4. Papers showing the actual situation regarding social sustainability and open innovation^{4),5)}.

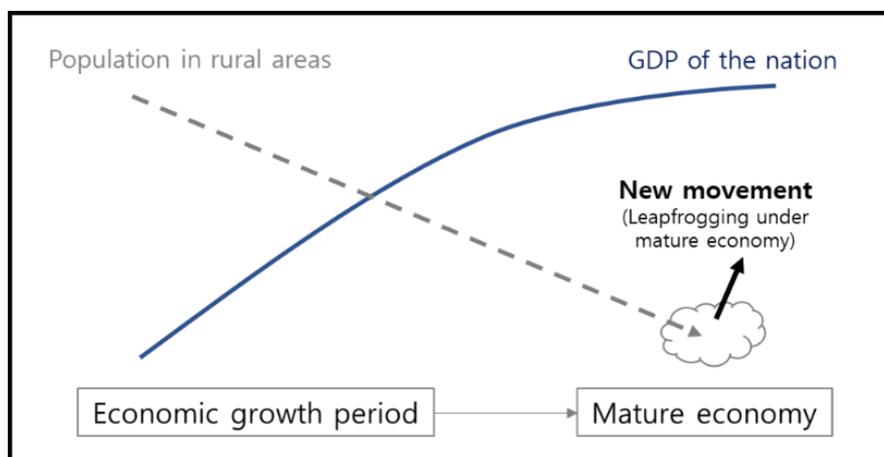
Design/ Methodology/ Approach:

In this study, we carefully analyze the spontaneous events observed in local areas where the disparity from urban areas reached a marked level in a society (nation) that shifts from economic growth to maturity. Specifically, we examine some cases, such as Asai nursery and Ebiya, in the southern part of Mie prefecture where the author was involved. These businesses are based on traditional companies but reformed in response to changes in social environments and dramatically

improved business results in a short period of time. In this research, we analyze the actual situation such as the characteristics of business, growth potential, ripple effect on regional industry, etc. on the new type of business model that is appearing in Mie prefecture, Japan.

(Expected) Findings/Results:

It was concluded that there are the spontaneous events such that old companies dramatically improved own business adapting to social change occurring in local areas where the disparity from urban areas reached a marked level in a society (nation) that shifts from economic growth to maturity. In response to changes in the social background, old businesses in local areas changed the business model and grew rapidly, then I regarded it as a kind of leapfrogging type growth. Based on our research experience at Mie prefecture, this study confirms the validity of our hypothesis that "a leapfrogging phenomenon occurring in the region where local governments are expected to annihilate due to the reaction of economic growth."



Events occurred in rural areas from Japan's economic growth to economic maturity period
(conceptual diagram)

Research limitations/ Implications:

The new way of thinking of "events related to the leapfrogging phenomenon occurring at local areas under the mature economy" is still a case study in Mie prefecture and is staying on the study on the beginning of this phenomenon. Therefore, there is a limit to making this theory universal. However, it is also important to understand precisely "the new movement that began to breathe away from the region that was exhausted by the reaction of Japan's economic growth" and to arrange it as an applicable way for thinking of the future of Japan. It is also important to carefully consider the events occurring in the rural areas of Japan and to understand the theoretical understanding of the matters that occur under the circumstances. We anticipate that these become important knowledge to solve problems which will be appeared in Asian countries that will experience the economic development following Japan.

Keywords: Leapfrogging, matured society, regional innovation

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- 4) *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*, MinHwa Lee, JinHyo Joseph Yun, Andreas Pyka, DongKyu Won, Fumio Kodama, Giovanni Schiuma, HangSik Park, Jeonghwan Jeon, KyungBae Park, KwangHo Jung, Min-Ren Yan, SamYoul Lee and Xiaofei Zhao, *J. Open Innov. Technol. Mark. Complex.* 2018, 4(3), 21
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Green Governance: Connotation and Blockchain Based Implementation

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Abstract

The issue of green governance has been and continues to be a hot topic for the world and China. However, extant research still has limitations on the connotation of green governance and ways of implementing green governance. The study argues that: (1) Realizing the harmonious and sustainable development of human beings and nature is one part of the overall objectives of green governance---achieving the "green" of ecological environment. Constructing a green governance system that consist of rational procedure, scientific decision-making process, and deliberative democracy is the other part---realizing the "social green" of human society; (2) The accomplishment of green governance objectives requires the broad participation of governments, enterprises, social organizations, and the public, etc. It is crucial to consider the willingness and attitude of each entity to participate in the process of green governance. The successful realization of green governance rely on a coordinative and collaborative system of each participants; (3) Blockchain

is an effective way to achieve green governance objectives. This technology can solve many technological barriers and institutional obstacles in the implementation of green governance. It can provide computational trust to greatly lower the threshold of public participation in green governance, can reflect each individual's green behavior completely, can realize the whole green process traceability, can reduce the information asymmetry and the trust cost through decentralization. The study contributes to the green governance connotation and implementation literature in three main aspects. First, we revisit the connotation of green governance, explore the objectives of green governance, separate the objective of governance results greening and the objective of governance process greening; Second, we categorize the green governance participants by two dimensions of their roles in green governance and their attitudes toward green governance; Third, through case analysis, we propose that blockchain technology can be applied to green governance implementation aiming at effectively solving the technical bottlenecks and institutional barriers of green governance. This study not only extends theoretical research on green governance issues, but also provides useful guidance for the practical implementation of green governance.

Purpose/ Research Question:

In this study, we will investigate the following research questions:

- 1. Can we extend our understanding of a more fine-grained typology of green governance stakeholders?*
- 2. Whether blockchain technology will lead to innovation and transformation of green governance?*
- 3. If blockchain technology can lead to innovation and transformation of green governance, what applications of this technology can be applied to environmental and social sustainability?*

Key Literature Reviews (About 3~5 papers):

1. Connotation of green governance

The existing research on green governance remains rare and is generally based on ecological theory. The definition of green governance provided by scholars is

also considerably different because of the various research objectives. Although governance is an interdisciplinary concept, scholars' understanding of the connotation and attributes of "governance" are generally consistent. Scholars have a relatively unanimous view that governance is an institutional arrangement that is used to reconcile conflicts amongst stakeholders, thereby encouraging them to adopt joint actions to achieve scientific decisions. Green is a symbol of life and the background color of nature. Therefore, green is often used to refer to economic, social and environmental systems, which can further represent the relationship between humanity and nature.

Therefore, from the perspective of scientific decision-making and the long-term development of the relationship between mankind and nature, governance should be combined with green and the concept of green governance should be introduced in a timely manner. Li, et al. (2016) defined green governance as follows: green governance coordinates the conflict between human and nature through the design of a set of institutional arrangements or mechanisms, thereby ensuring the scientific decision-making of global green governance actions and ultimately maintaining the continuous and stable operation of the economic-social environmental system. This study will learn from the definition and will extend the our understanding of a more fine-grained typology of green governance stakeholders.

2. Blockchain technology facilitate green governance implementation

Technological advancements have caused a revisiting of sustainability practices. According to ecological modernization theory, technology can help decouple environmental degradation from economic growth (Bergendahl, et al., 2018). In some cases, technology can benefit both dimensions. As the triple-bottom-line sustainability definition includes social dimensions, whether technology can contribute to all dimensions of sustainability is unclear.

Advances in technology are broad-based and include a variety of production, information, and social technologies. These technologies include current and future developments in such disparate, but possibly interrelated (Sarkis & Zhu, 2018). Each of these technologies has implications for the sustainability of organizations

Since its introduction as the underlying technology of Bitcoin (Nakamoto, 2008), blockchain technology emerged from its use as verification mechanism for

cryptocurrencies and heads to a broader field of economic applications. Blockchain-based systems are basically a combination of a distributed ledger, a decentralized consensus mechanism, and cryptographic security measures. In combination with smart contracts, they may revolutionize the functioning of transaction systems and enable fully decentralized market platforms. More precisely, blockchain technology allows the resolution of conflicts and dismantles information asymmetries by providing a transparent and valid record of past transactions that cannot be altered retrospectively. As a result, governing intermediaries can be cut out, which leads to potentially more cost-efficient (micro) transactions.

Although the primary focus had been on financial applications, the unique characteristics of blockchain technology inspired broader use of this technology in different markets and even for non-financial business purposes. Supply chains, real estate, government, healthcare, and energy sector use cases have been some effective applications

Blockchain application in energy industry presents great and practical prospect. Parallel to the newer solutions of power transmission considering environmental benefits, the blockchain in the field of energy is now reaching multiple markets over the world, with an aim to create a decentralized autonomous energy (DAE) community. For example, decentralized solutions using blockchain peer-to-peer systems for managing demand response programs were proposed to improve current energy grid operations. The same method was applied to promote clean energy such as solar photovoltaic (PV) in China. Besides, one could also refer to the start-up TransActive Grid in Brooklyn, New York, which was co-founded in 2016 by the traditional micro-grid company LO3Energy and the blockchain technology company ConsenSys. With blockchain technology, TransActive Grid allows residents with solar PV panels to sell energy to their neighbors without a middle-party. The transactions are documented in the blockchain with very minimal need of human efforts, removing the possibility of corrupt or missing data. Meanwhile, blockchain supported energy systems such as SolarCoin, Grid Singularity and Grid+ are developed and implemented.

Design/ Methodology/ Approach:

The study will theoretically explore and analyze the connotation of green

governance. Then, a multiple case study will be provided to demonstrate the blockchain application to improve environmental and social sustainability.

(Expected) Findings/Results:

In this study, we attempt to extend our understanding of green governance connotation and provide an overview of the potential of blockchain technology in the sustainability and green governance context. Our primary focus was identifying potential uses across the spectrum of green governance stakeholders and their activities, specifically on environmental and social sustainability.

The study is expected to present: (1) Realizing the harmonious and sustainable development of human beings and nature is one part of the overall objectives of green governance---achieving the "green" of ecological environment. Constructing a green governance system that consist of rational procedure, scientific decision-making process, and deliberative democracy is the other part---realizing the "social green" of human society; (2) The accomplishment of green governance objectives requires the broad participation of governments, enterprises, social organizations, and the public, etc. It is crucial to consider the willingness and attitude of each entity to participate in the process of green governance. The successful realization of green governance rely on a coordinative and collaborative system of each participants; (3) Blockchain is an effective way to achieve green governance objectives. This technology can solve many technological barriers and institutional obstacles in the implementation of green governance. It can provide computational trust to greatly lower the threshold of public participation in green governance, can reflect each individual's green behavior completely, can realize the whole green process traceability, can reduce the information asymmetry and the trust cost through decentralization.

The study contributes to the green governance connotation and implementation literature in three main aspects. First, we revisit the connotation of green governance, explore the objectives of green governance, separate the objective of governance results greening and the objective of governance process greening; Second, we categorize the green governance participants by two dimensions of their roles in green governance and their attitudes toward green governance; Third, through case analysis, we propose that blockchain technology

can be applied to green governance implementation aiming at effectively solving the technical bottlenecks and institutional barriers of green governance. This study not only extends theoretical research on green governance issues, but also provides useful guidance for the practical implementation of green governance.

Research limitations/ Implications:

The research on blockchain and green governance is in its infancy with the academic field fertile for sowing ideas, theories, and analysis; many of which will grow. Given the more pragmatic perspective of this study, we will only briefly touch upon broader theoretical and philosophical concerns of blockchain technology in green governance. A complete and detailed theoretical research evaluation of blockchain technology is still required, but true empirical and theoretical evaluation will mature as adoption matures. Moving beyond the hype and hope is necessary for rational determination of effectiveness.

Keywords: green governance, connotation, blockchain, implementation

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Bank Governance, Media Coverage and Green Loans

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Abstract

Purpose/ Research Question: This paper attempts to examine the governance mechanisms that may affect the green lending behavior of banks.

The banking sector plays an important role in promoting environmental protection. Specifically, banks are main capital providers of the enterprises, especially in the emerging and transition economies where the capital market is still less developed. Fully exerting the capital allocation function of banking industry can effectively guide the companies to adopt cleaner production activities. However, the environmental performance of banks is worrying. For example, banks may still issue loans to the polluting enterprises (Schepers, 2011) and there are serious problems in the transparency and credibility of the environmental information disclosed (Prakash and Potoski, 2007). What's worse, free-rider problems even exist in the banks that abide by the Equator Principles (Christopher and Alexis, 2006). Therefore, in view of the important role of banking sectors in environmental protection, this paper intends to explore the governance mechanisms that affecting banks' environmental loans.

Key Literature Reviews: The increasingly serious environmental problems have aroused people's attention. Environmental externalities highlight the importance of the government, which plays a key role in promoting industrial upgrading and cleaner production and thus realizing the so-called "Green Governance" (Cooke, 2015; Kim et al., 2016). It is the same thing for the banking sector. However, there are few researches about the banks' environmental responsibility and the factors that affect banks' environmental loans have not yet been studied at present, while existing studies having made in-depth analysis on the economic performance, risk and business behavior of banks (e.g. Laeven and Levine, 2009). Our paper relates to the literatures that investigate the relationship between government ownership and bank loans. Sapienza (2004) who finds that the State-owned banks charge lower interest and mostly favor firms located in depressed areas, is the paper most closely related to ours. A useful way to compare our paper with Sapienza (2004) is that he focuses on the social effect of government ownership, while we examine the environmental responsibility of banks. The mass media is also of great significance in improving the environmental performance of banks in that it can attract the attention of the public through information dissemination, making the banks reported be more exposed to the public pressure and enhancing the reputation effect. In addition to the perspective of environmental legitimacy, Corte et al. (2015) have also verified the role of media in promoting social innovation.

Design/ Methodology/ Approach: This paper tests the hypotheses based on the empirical analysis of China City Commercial Banks (CCB) from 2008–2015. We obtained 305 observations of 74 CCBs after eliminating the missing samples by manually collecting the information disclosed in the social responsibility reports and annual reports of the city commercial banks. We use samples from 2008 because the issuing of Opinions on Implementing Environmental Protection Policies and Regulations to Prevent Credit Risks is in the year of 2007. This paper studies the possible impacts of government ownership of banks and the political connections of chairmen on the banks' green lending behavior, and examines the role of media coverage. Our empirical analysis also controls the corporate characteristics and other governance characteristics of the city commercial banks, the economic and environmental conditions of the cities where the headquarters of the city commercial banks are located, as well as the time effect.

(Expected) Findings/Results: Using the samples of CCBs, we find that government ownership of banks and media coverage can effectively promote green loans of banks, while political connections do not. The media coverage can positively moderate the relationship between government ownership and green loans. However, it must be pointed out that only the media reports about the banks environmental and social responsibility have the moderating effect while other types of media reports do not play a significant role, which indicates that the dissemination of banks environmental and social responsibility behavior can strengthen the motivation of government shareholders to promote green loans. In addition, we further test the heterogeneity of the role of the media coverage and find that the role of national medias is stronger than that of market-oriented ones, while the provincial ones do not play that role. The above results remain robust after replacing variables measurements and considering the endogenous problems.

Research limitations/ Implications: Our findings contribute to the literature in several ways. Firstly, this paper takes the lead in analyzing the governance mechanism that affects the green behavior of banks and providing empirical evidence on how the government ownership and media coverage influence the green Loans of banks, which is helpful to understand the motivation of banks to implement green policy and find effective ways to promote environmental protection. Secondly, unlike previous studies that emphasized the economic performance of banks, this paper starts with the analysis of the role of government ownership from the perspective of environmental performance. Thirdly, this paper contributes to the literature with regard to the impact of media coverage on the allocation of bank credit funds by directly using banks as samples, and verifies the governance role and information role of the media.

This paper also has limitations. There is no clear standard of green loans in China, and the condition of environmental and social responsibility disclosure by city commercial banks is different. Therefore, limited by the availability of data, we choose a more stringent indicator as the proxy of environmental loans. This indicator can better reflect the environmental tendency in banks' decision-making. Therefore, more direct indicators can be used in the future researches with the improvement of information disclosure requirements.

Keywords: Bank Governance, Media Coverage, Green Loan, Government Ownership, Political Connection

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Why They Go There: Maslow's Hierarchy of Needs and Revisit Intention

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Abstract

The tourism industry is considered one of the largest and fastest growing industries in the world. Travel motivation forms an integral part of travel behavior and has been widely researched and applied in tourism marketing strategies. Previous studies pay lots attention on the new destination as travelling purpose. However, the motivation and the revisit intentions remain largely explored. The destination choice has always been an important aspect in tourism literature and there are various factors influencing travel decisions. In the other words, the need to see the unseen and know the unknown drives people to revisit places and motivates them to visit destinations again. Since time immemorial, travel motivation is one of the most researched themes in the tourism literature. Regarding the increasing of the education level in Taiwan, the popularity of online social media, the rising of chain hotels establishment, and more convenient transportations all have intensified the willingness of Taiwanese to travel abroad. This research applied the Maslow's hierarchy of needs theory to investigate each level of need and its influences on revisit intention. Two focus groups have performed to facilitate understanding the impact factors of the motivation and revisit intentions. The study established that tourist motivation has relationship with their satisfaction; likewise, satisfaction is a determinant of their revisit intentions. The result recommended that service providers and destination managers should work at customized travel package design and ensuring tourist satisfaction in order to ensure repeat visits.

Key words: Maslow's Hierarchy of Needs, Revisit intention, Tourism Industry

Introduction

The tourism industry is considered one of the largest and fastest growing industries in the world. Tourism is an inherently social phenomenon. The fascinating phenomenon of tourist behaviour deals with topics such as motivation, destination choice, travellers' on site experiences, satisfaction and learning. Regarding the increasing of the education level in Taiwan, the popularity of online

social media, the rising of budget chain hotels establishment, and more convenient transportations all have intensified the willingness of Taiwanese to travel abroad.

Crompton (1979) notes that it is possible to describe who, when, where, and how of travel motivation, but there is no answer to the question 'why', the most interesting question about travel behaviour. Travel motivation relates to why people travel (Woodside & Martin, 2007) although it has been investigated by many researchers from different field such as from sociology, anthropology, and psychology (Cohen, 1972; Dann, 1977; Crompton, 1979, Gnoth, 1997; Vuuren and Slabbert, 2011). Basic motivation theory suggests a dynamic process of internal psychological factors (needs, wants and goals). In other words, previous researches about travel motivation analyse the application theories mainly from mainstream psychology. Maslow's (1970) hierarchical theory of motivation was one of the most applied in the tourism literature. This research applied the Maslow's hierarchy of needs theory to investigate each level of need and its influences on revisit intention in order to uncover the motivation behind travel.

In addition, March and Woodside (2005, p116) state that specific decisions embraces one or more of the behavioural intensions based on the need to behave in a certain way according to highly defined situations. In order to predict travel behaviour it is important to understand how individual characteristics of a person interact with the characteristics of the situation, therefore understanding the positive and negative evaluative factors influencing destination choices of the tourists (March & Woodside, 2006; Laws, 1995; Holloway, 2004). Thus, this paper attempts to identify motivation factors of Taiwanese tourists to the revisit destination as they demonstrate different domains of behaviour, which may have important marketing implications to the country. It is also important to recognise the fact that knowing the importance of both factors can help destinations meet the desired needs of individual travellers from different markets in order to predict future travel patterns.

Purposes of the Study

The objective of this study is to investigate the reasons why tourists choose to revisit the certain destination and activities in order to understand their travel motivation. Consequently, the finding can be used to assist the travel industry to formulate their marketing strategies. In other words, this study is used in attempt to have better understanding of relationship between travel motivations and revisit intentions, so that the tourism industry can manage their marketing strategy more appropriate and encourage more tourists to revisit. Therefore, the main research question is to understand the tourist's motivation for revisit intention and apply Maslow's needs hierarchy to analyse their relationship.

Objectives are to:

1. Review the literature of concepts and theories in Maslow's hierarchy theory
2. Explore the revisit intentions for the individual travellers.
3. Understand the current marketing strategies of travel package for revisit.

Literature Review

Motivation can be defined as an internal psychological force arising from an unsatisfied need, which subsequently pushes individuals to engage in a specific need-fulfilling behaviour or activity. People do everything for a reason, although sometimes it is not easy to determine expressly what the reason is (Solomon, 2004). To understand motivation in tourism is to understand what motivated tourists to choose a certain destination. According to George (2004) as well as March and Woodside (2005) travel motivations can be considered as one of the most important psychological influences of tourist behaviour. Motivation is the reason for people's actions, willingness and goals that indicates the direction to behaviour, or what causes a person to want to repeat behaviour, a set of force that acts behind the motives. Motivation is likely as a process where the need activates a selected behavior to achieve our goal.

Maslow's hierarchy of needs theory is one of the most popular motivation theories and it's also considered one of the most important theories in psychology. According to Maslow people has a specific needs and they are motivated by their desire to satisfy these needs. This theory also proposed that the lower -level needs must be satisfied before higher-level needs become important. Travel motivation reflects one's needs and wants and can be viewed as a critical variable in relation to their purchase decisions. Maslow hierarchy theory helps to identify the different needs that motivate travelers and, in other hand, it will be enhancing service providers' knowledge about what kinds of experiences travelers seek, especially for certain groups of people. Thus, here Maslow's hierarchy is considered a useful tool for understanding travel motivations, developing marketing strategy, appropriate advertising appeals and as the basis for market segmentation and product positioning because consumer goods often serve to satisfy each of the need levels. Understanding of travelers' motivations is critical to predict future travel patterns. Maslow's five-level hierarchy need theory has been broadly accepted and used to explain travel behavior.

Maslow hierarchy of needs theory

Hierarchy of needs theory was proposed in the 1943 by Abraham Maslow. Maslow's theory is one of the most frequent used to explain the premise of motivation and uses five sets of goals which are also referred to as basic needs: physiological needs, safety needs, social needs, self-esteem and

self-actualization (Tikkanen, 2007). On the bottom of the pyramid are all physiological and safety needs such as food, water, air, rest etc. Higher levels represent higher needs, which are more complex. An affiliation on the third level of the pyramid says about belonging to a groups such as family, school or work colleagues groups; a need of love and friendship. On the fourth level are self-esteem needs such as respect, achievement, confidence, need of being recognized. Self-actualization needs are on the last level of the Maslow's pyramid are creativity, morality, spontaneity, problem solving.

Methodology

Focus group discussion is appropriated method to explore the perception (Morgan, 1993), and it can be used as the primary or a supplementary source of data, during the exploratory or the later stages of a research project (Hussey & Hussey, 2001). This study adopts the focus group to explore the travel motivation and revisit intentions; however, due to the budgetary constraints and accessible reason, in total, two focus groups were conducted. Two focus groups have performed to facilitate understanding the impact factors of the motivation and revisit intentions. The investigation was conducted at Taipei city. The questions were developed by analysing similar previous research studies. Two focus groups were conducted for the purpose of this research study. The first focus group was conducted with 8 travel agents that all have more than 6 years experiences for travel package planning and second focus group was conducted with 10 travel bloggers who have plenty individual travel experiences. This study applied template analysis which systematic reviewing or evaluating the result. This study applied the coding selected text segment to create both categories and differentiations.

Findings and Implication

It is important to investigate the travel motivation about revisit destination. This is because repeat tourists can offer a relatively constant source of income and revenue for famous destination (Khuong and Ha, 2014). Also it may cost less if compare to acquire new tourists. The study offers an attempt to understand tourist motivation and extend the theoretical and empirical evidence on the intentions of revisit destination. Destination revisit intention has been viewed as an important research topic both in academia and the tourism industry. This study observes tourists' revisit intentions from Maslow's hierarchy of needs and its application to travel motivation. Regarding the intention often changes over time, to understand the formation of destination revisit intention, the study establish that tourist motivation has relationship with their satisfaction; likewise, satisfaction

is a determinant of their revisit intentions. This paper offers a good understanding of travel motivation by discussing Maslow's need theoretical applications in real-world situations. The implication shows that service providers and destination managers should work at customized travel package design and ensuring tourist satisfaction in order to ensure repeat visits. In other words, the results indicate that satisfaction is a direct antecedent of tourist revisit intention. In other words, the satisfaction of past experience as like trigger for the individual travel willing to revisit the same destination. Also, the country should capitalise on, for example, its heritage, natural attraction, food and culture that are widely recognised as essential tourism assets to develop its tourism industry. Therefore, this study suggests that a successful marketing strategy in destination areas which needs to focus on the individual travel motivation and how to design promotional programs to encourage their satisfaction.

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78.

The AI integrated AR training mode of Semiconductor industry- by hotel conference and exhibition

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Abstract

Purpose/ Research Question

- Semiconductor suppliers apply AI integrated AR training mode to simulate what is key success factors at hotel conference and exhibition course.
- What is the key success factors of user autonomously accept AI integrated AR training mode.
- The AI integrated AR training mode if positively influence to user satisfaction.

Key Literature Reviews: A. Contingency Theory

The Contingency Theory was proposed by Fiedler, F.E. in 1964. Based on the leader's personality features and behaviors, it concluded that the organizational performance is subject to 3 situational variables: organizational environment, task structure and the leader's power and authority.

- It is commonplace to assert that organizations are complex and that they change continuously over time. The contingency theory is still considered as a major theoretical foundation for situating the organization (Aubry, Monique, et al, 2018)

B. Theory of Planned Behavior, TPB

The TPB was proposed by Ajzen, I. (1991) as an extension of the theory of reasoned action (TRA; Fishbein and Ajzen 1975). By adding Perceived Behavioral Control as the third construct in the TRA model, the TPB explains the intention to perform the behavior. Intention is driven by how hard people are willing to try to perform a behavior and it has been shown to be influenced by attitude, subjective norms and perceived control of behavior.

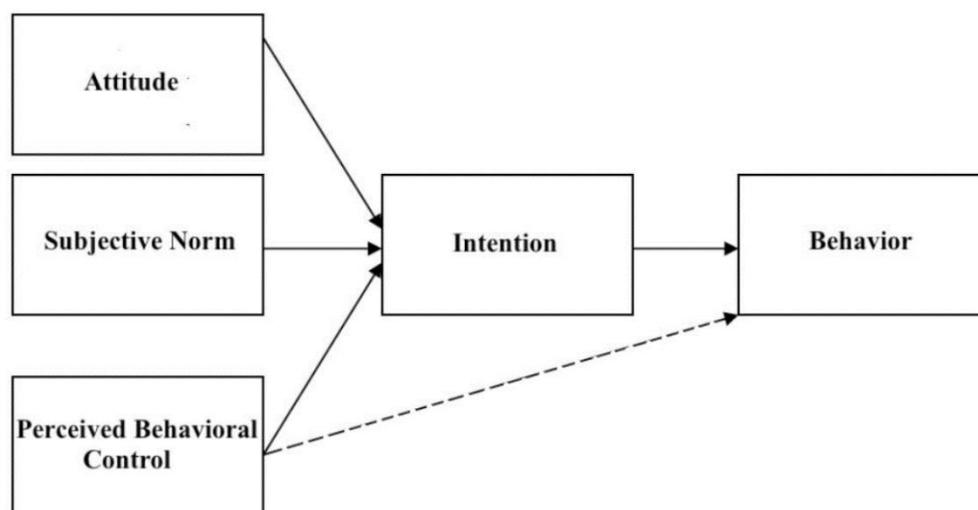


Figure 1. Theory of planned Behavior

- Attitudes, subjective norms and perceived behavioural control significantly

predicted the teachers' intention towards teaching dyslexic pupils, thus confirming the applicability of the selected TPB mode(Stampoltzis et al, 2018).

C. Information System Success Model, ISSM

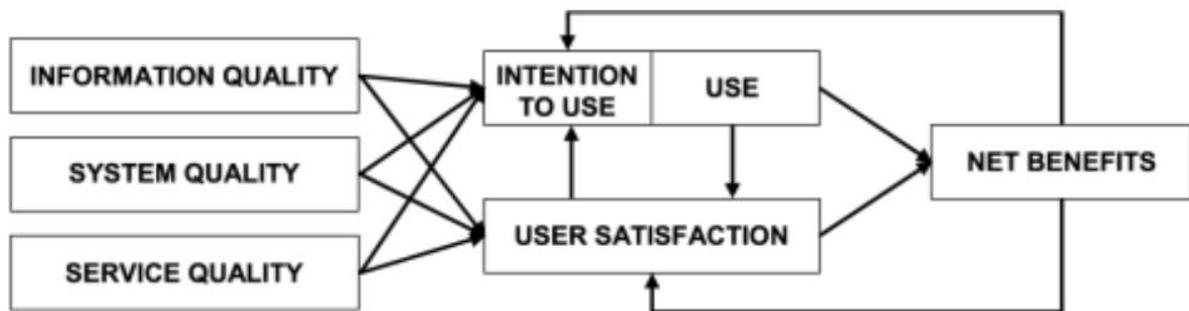


Figure 2. Updated D&M IS Success Model

- DeLone and McLean(2003) revised the original model in response to the strengths and weaknesses identified by researchers. The updated model variable, service quality was added to the model to capture the importance of service as a contributor to Updated D&M IS success model.
- Han et al.(2018) The user perceived benefits have an important influence on the satisfaction and continuance intention.

D. Artificial intelligence

- Hang Sik Park (2017) In the Fourth Industrial Revolution, smartization in which achieved computers and machines communicate interactively and independently by AI.

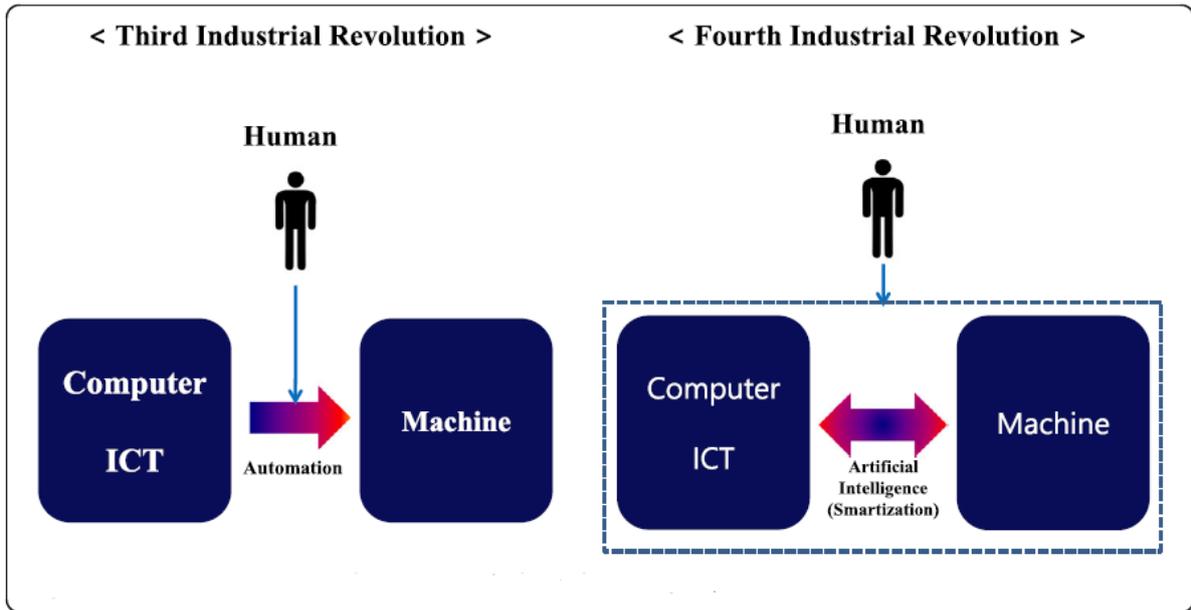
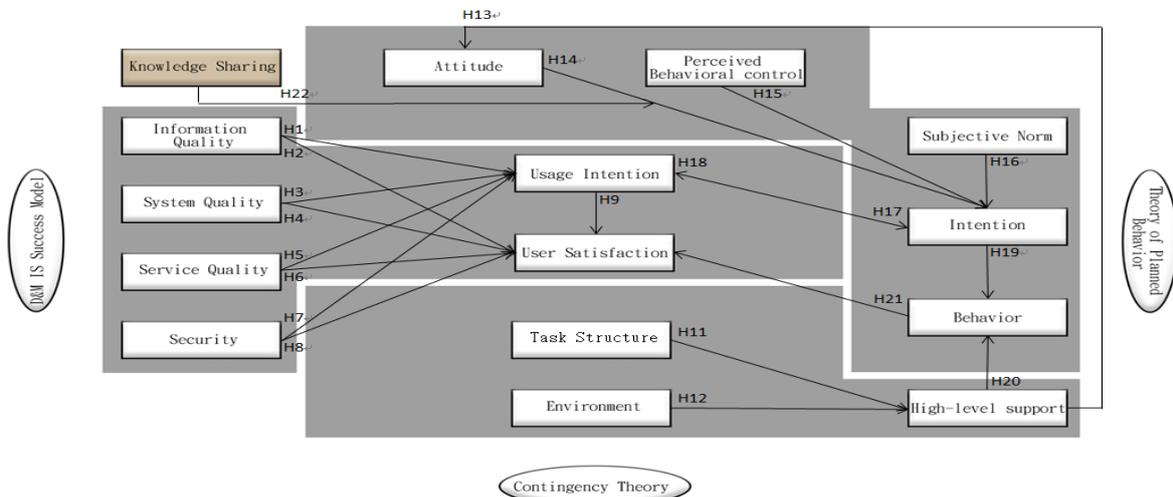


Figure 3. Comparison of the Third and Fourth Industrial Revolutions

E. Augmented Reality

- Lee et al.(2018) The AI technology separation of intelligence and recognition and fusion of virtual space and actual space have been achieved. Because the size of the virtual space determines the size of the market, it should make people feel the virtual space.

Design/ Methodology/ Approach:



- Jagannathan et al(2018) was used Updated D&M IS success model with a security as a new dimension to evaluated the context of Internet Banking, The results found that security is a key factor for IB success. This study also found security and information quality if found to influence user satisfaction.
- Amend "usage intention" unilateral positive influence to "user satisfaction" per ZPD(Zone of Proximal Development) concept, due to implement AI training.

(Expected) Findings/Results

- Set up a successfully model for Semiconductor suppliers to develop AI integrated AR training course, it is effectively apply to hotel conference and exhibition environment.
- Verify the AI integrated AR training mode is positively influence to user satisfaction and organization benefit.
- Analyze correlation between statistical data, theory and practical, proposed recommendation to improvement system , developing new features or apply to other industry of Semiconductor.

Research limitations/ Implications:

- This research target to employees of Semiconductor-related industries, it possible impact by sampling deviation. Therefore, the research results be able applied to other industries are subject to future verification.
- Taiwan government announced it was subject the first year of AI in 2017. The core technology and application program are still under development, I don't rule out the possibility of the respondents think themselves as understanding AI who impacted accuracy of user Satisfaction.

Keywords: Contingency Theory, Theory of Planned Behavior, Information

System Success Model, Artificial Intelligence, Augmented Reality

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Construction of AI model of trust fund raising
— to hotel industry as the raising of mark

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Abstract

✓ Purpose / Research Question: Contents

The revolutionary changes in financial industries in last decades make fundamental changes in the perspectives of convenience and the service content when users use information systems. In the 21st century, a successful company will perform different values by applying innovate technologies and experiencing big-data transactions. In addition, by using AI technology, a company can streamline its organization, react quicker and provide feedbacks timely to information system users. It is a trend that all companies will engage in AI and data processing technology in the future. Hence, there would be critical issues that an asset management company raises capitals via AI platform, creates intelligence transaction models, and then achieves the goals of the management.

✓ Key Literature Reviews (About 3 ~5papers): Contents

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✓ Design / Methodology / Approach: Contents

This study explore the investment trust fund-raising AI modeling study — the discussion in the hotel industry to raise target, the task technology fit model, impression management theory and expectation confirmation theory as the theoretical basis, director of view as a hierarchical view and deployment, through the questionnaire survey as the research method, and using the structural equation model (SEM) as the statistical analysis.

This paper discusses the theory of task technology fit, TTF. TTF is related to the concept, cognitive fit in the theory of cognitive cost-benefit, introduced by Vessey in 1991. Considering about that all approaches to evaluate the success of information system were user-subjective and defective, Goodhue and Thompson introduced TTF in 1995. Goodhue and Thompson proposed that whether an information system is successful should depend on its capability to meet users' task requirements. If a system could support the users effectively, it would increase frequency which the users use the system and improve the users' performance. It is mainly to address the suitability between the capability of a certain technology and the features of the supported missions. A satisfied suitability between the technology and a mission will bring positive performance.

Second, it discusses historical methods to successfully raise capitals. The successful methods to raise the capital via AI platform will be continued and the methods causing complains will be discarded. This ensures the best methods to raise capitals to be retained.

Finally, combined with the Expectation and goal of the supervisor, the Expectation Confirmation Theory (ECT) is mainly used to measure and evaluate the consumer's satisfaction with the service or product and the post-purchase behavior

(Oliver,1980). Anderson & Sullivan (1993) as the research model infrastructure of general consumer satisfaction. Some scholars put forward modified models of expectation confirmation theory for different application environments. Bhattacharjee (2001) proposed the Expectation Confirmation Model (ECM) after integrating ECT with the Technology Acceptance Model (TAM).Study of information system (IS) the continuation will verify the continuation of the Internet service will IS expected from the results, the past literature not to do the three theoretical relationship, this study combined with the task-technology fit (TTF) theory, impression management theory, expectation confirmation theory to explore investment trust to raise funds to use big data and information through equipment - to extract from the closest companies (in the hotel, for example) track the success of the key factors of funds, and

the statistical results and clear analysis as a reference for decision support, to improve the investment trust financing pattern, increase the performance of the funds raised and enterprise organization efficiency improving, desired goal to raise money.

✓ (Expected) Findings / Results: Contents

The abbreviation of artificial intelligence is AI. An AI system generally has an expert system with a knowledgebase including knowledges of specific fields and inference engine program. In general, a larger volume of the knowledgebase brings better quality of problem resolving. The logics of an AI system to resolve problems are not pre-set but adopts trial and error to find the answers. This method is so called heuristic rule or pattern-invoked. That's the reason an AI system applies in the information system of the asset management industry.

The conclusion of this study is that the AI model of investment and fund-raising can be applied to other industries with capital allocation.

✓ Research Limitations / Implications:

This study aims to find out the key factors for AI structure application in the investment trust industry in a more objective way. Limitations are as follows:

- 1) Information users in the investment trust industry or other relevant industries were randomly picked for this survey.
- 2) As this study is based on the opinions of information users in the investment trust industry or other relevant industries, the design of the survey mainly reflects the objective responses and opinions of these information users.
- 3) This study might be affected by sampling bias. For this reason, whether the results of this study can be applied to other industries still needs further verification.

✓ Key word:

Asset Management Industry, Artificial Intelligence(AI), Task-Technology Fit Theory (TTF), Impression Management Theory(IM), Expectation Confirmation Model Theory (ECM)

Sustainability and Continuous Improvement of Organization: Review of Process-Oriented Performance Indicators

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Abstract

Purpose/ Research Question: Nowadays organizations are trying to have not only a competitive advantage in the market but also an advantage in sustainable development. This is not only an internal decision made by the organization's management level. More organizations are pressured by their stakeholders to report on their performance in a much wider perspective, such as triple bottom line reporting [1-3]. Many authors address the organization's sustainable performance and openness to innovation as important requirements for continuous development [4-5]. The aim of this research is to determine a group of performance-based indicators used to measure sustainability in the organization's overall performance and processes. The current research investigates how process-oriented performance indicators can help organizations be sustainable and promote continuous improvement.

Key Literature Reviews: There is a wide range of possibilities how organizations could measure their performance regarding sustainability. It also depends on what level of performance the organization is looking at – organizational, process or performer level [6]. The size of the organization, complicity of the organization's structure and different processes could be some of the main issues that complicate measuring organizational performance [7]. To solve this problem there have been identified organization's performance dimensions such as financial performance, customer satisfaction, employee satisfaction, social performance and environmental performance [8]. Each of those dimensions consists of a set of performance indicators that could be measured and analyzed in terms of organizational and process levels. In a different perspective, some organizations use economic indicators such as productivity regarding use of resources and creating value for the customer to measure the performance [5].

Often organizations use predefined models to measure the overall performance from different perspectives including corporate social responsibility and sustainability. It is not obligatory but many organizations use different sustainability frameworks for reporting on their performance. Some

authors have already researched the difference between sustainability frameworks and standards such as GRI and AECA and how complimentary they are [1]. Each of these frameworks consists of a different set of performance-based indicators that may vary depending on the main reporting goals of the framework or standard. In this case, it means that different kinds of organizations use the same predefined set of indicators introduced by the sustainability framework to measure a different range of activities. Therefore, the organization's management needs to have a good understanding of what is relevant and important to the organization [9]. It is necessary to choose the most appropriate framework or define an adaptive version with a set of indicators that best describe the suitability of the organization's performance.

Although it is important to integrate and externally report on activities related to sustainability in an organization, there is still a weak link of systematic sustainability integration in the organization's strategy as many authors consider this an issue [10]. For this reason, some organizations use a different set of tools that complement a set of internally defined sustainability indicators. For example, organizations use process mapping not only for process development but also for identifying environmental improvement initiatives [2]. Organizations with a performance measurement system that measures sustainable performance are more likely to be able to manage sustainability in their organization [10]. For this reason, further research will be focused on determining process-oriented performance indicators that comply with sustainability and continuous development.

Design/ Methodology/ Approach:

Scientific publication review has been used in the development of this research paper. This research is based on literature about process-oriented organizations, frameworks, and standards indicating sustainability, organization and process level performance indicators. The literature review highlights the main groups of indicators that describe the organization's sustainability at different levels. Further research is limited only to process-oriented indicators that describe sustainability because research on overall organizational performance indicators is extensive.

(Expected) Findings/Results: Literature review on performance-oriented indicators that indicate sustainability has been done. Based on the literature review, the authors have developed a set of performance-oriented indicators that are used to measure the organization's sustainability. These indicators have been divided into different organizational performance dimensions to better highlight the importance of sustainability across all levels of the organization.

Research limitations/ Implications: There are many levels of how to assess in depth the organization's performance regarding sustainability. In this research, the authors are focusing on determining process and organization level performance indicators that indicate the organization's sustainability. The paper is also limited to the research of growing organizations that are preferable in the context of the organization's lifecycle stages. This limitation of lifecycle stages ensures that only organizations with a focus on continuous development are being reviewed.

Keywords: organization development, sustainability, process-orientation, performance indicators,

continuous improvement.

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